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As a step in the bentonite flocculation test for trichinosis, trichina larvae are macerated into a suspension in a Ten Broeck tissue grinder. The extract is then absorbed on bentonite particles to make a stable antigen (see paper on trichinosis, p. 159).

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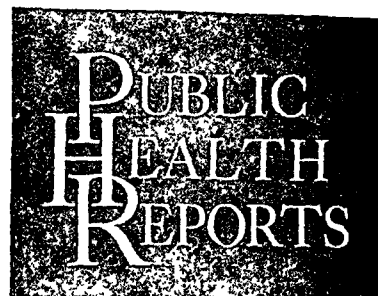
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frontispiece

Preserving the scenic beauty of the Nation is the aim of the anti-litter drive waged by thousands of communities (see page 387).

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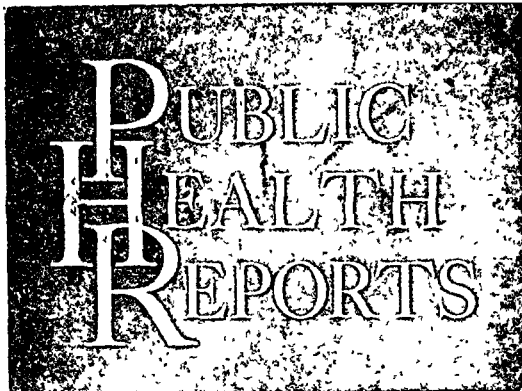
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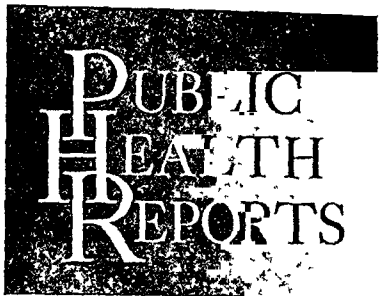
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Fluoridation of drinking water in Washington, D.C., was started June 1952 by the U.S. Army Corps of Engineers at the Dalecarlia Reservoir. (Statements on the fluoridation of public water supplies appear on pp. 511-520.)

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New York City's day care centers for preschool children are supported with health services organized by city agencies. (See article on pp. 567-572.)

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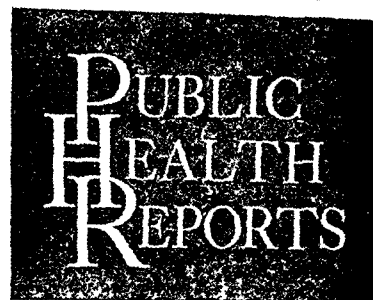
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The NS Savannah, the first nuclear-powered merchant ship, was launched in July 1959 (story appears on pp. 669-673).

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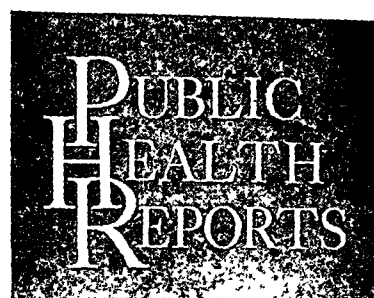
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An Asian child is one of the thousands who bear the pockmarks of smallpox. An article on the eradication of smallpox appears on pp. 771-778.

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Dr. Florence Rena Sabin, 1871-1953, distinguished physician and research scientist, represents Colorado in National Statuary Hall in the U.S. Capitol. The figure was sculptured by Joy Buba of New York City (see p. 903).

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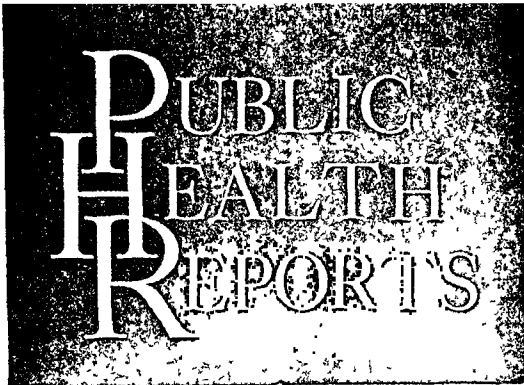
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PUBLIC HEALTH MONOGRAPH No. 57 . . . Exposure chambers for research in animal inhalation.

David A. Fraser, Ronald E. Bales, Morton Lippmann, and Herbert E. Stokinger

54 pages. A summary and information on availability appear on pages 939-940.



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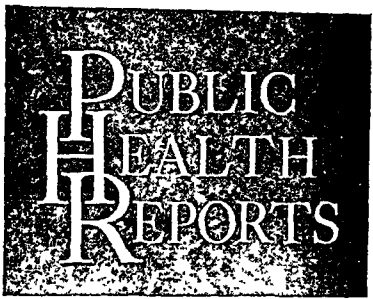
Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 58 . . . Patterns of retention, release, and death of first admissions to State mental hospitals.
E. S. Pollack, P. H. Person, Jr., M. Kramer, and H. Goldstein

A summary and information on availability appear on page 1024.

PUBLIC HEALTH MONOGRAPH No. 59 . . . Public health nursing service to patients.
Marion Ferguson

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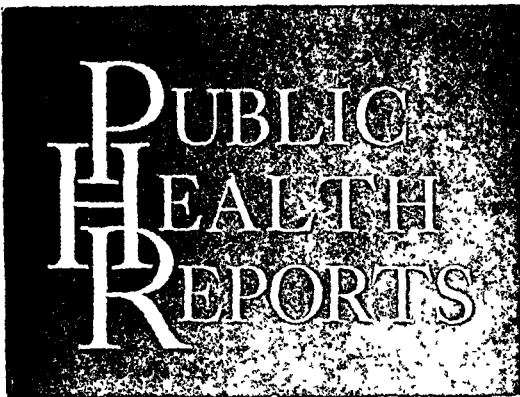
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Harold W. Wolf, Peter Skaliy, Lawrence B. Hall, Marvin M. Harris, Herbert M. Decker. Lee M. Buchanan, and Charles M. Dahlgren

A summary and information on availability appear on page 1123.

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
ARTHUR S. FLEMMING, *Secretary*

PUBLIC HEALTH SERVICE
LEROY E. BURNET, *Surgeon General*

Preparedness and Survival

SURGEON GENERAL LEROY E. BURNEY

IN his book, *Year of Decision*, Bernard de Voto wrote: "Sometimes there are exceedingly brief periods which determine a long future. The limb of a tree grows to a fore-ordained shape in response to forces determined by nature's equilibriums, but the affairs of nations are shaped by the actions of men, and sometimes, looking back, we can understand which actions were decisive."

De Voto's year of decision was 1846, a year of westward march and external crisis for the United States. Nowadays, events move at a swifter pace. In the turbulent world of the mid-twentieth century, every year is a year of decision.

Yet there are areas of demarcation and resolution which can be fixed firmly in a period of time. One such area is civil defense and the time is the present. For 1958 has been a year of decisive action in national civil defense and mobilization, that is, all the civilian activities undertaken for preparedness, survival, and recovery in time of war or emergency.

Actions taken by the President indicate the high priority he places on civil defense and mobilization programs in the Federal Government:

- Reorganization Plan Number 1 of 1958 coordinates the Federal Civil Defense Administration and the Office of Defense Mobilization into the Office of Civil and Defense Mobilization (OCDM). Central direction will reside in the Executive Office of the President.

This article is the substance of an address delivered by Dr. Burney before the 86th annual meeting of the American Public Health Association in St. Louis, Mo., October 28, 1958.

- The President will delegate specific civil defense responsibilities to various Federal agencies with policy determinations and coordination by OCDM, under the direction of the Honorable Leo A. Hoegh, former Governor of Iowa. The Public Health Service will be responsible for health and medical care operations.

- A new national plan for civil defense has been developed, spelling out principles and general strategy.

In sum, the entire civil defense and mobilization effort will be stepped up and given the kind of emphasis called for by these troubled times.

Civil defense is as urgent as tomorrow's newspaper headline and as near as a pushbutton. It cannot be shrugged away. It cannot be postponed until some indefinable date when we may be so generously supplied with personnel and resources that we can proceed in a leisurely fashion. That kind of future may never arrive. The dark specter of disaster—either natural or manmade—is an everyday possibility, hovering like an unwelcome neighbor just outside our door.

Are we ready for tomorrow's hurricane or flood or atomic explosion? If we as health leaders cannot answer that question with a resounding "Yes!" we are failing in our civic responsibilities. Medical and public health services for emergencies must be ready and they must be able to work. Leadership in civil defense planning is the strongest kind of evidence that the health personnel of this country have the safety of their fellow men at heart and are working to protect it.

To be sure, civil defense and mobilization are complex. There have been false starts and

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water plan, and the national biological and chemical warfare defense plan.

The national plan and its annexes will be our guide to civil defense principles and strategy. Actual operations, however, will depend very largely on local preparedness and effort. Federal planning is designed to develop the capabilities of local agencies and to coordinate the programs. But the States and communities must be ready to do the job.

We shall, of course, work closely with the States. We expect to rely on established relationships and to develop new ones. As in more familiar programs, the key to an effective civil defense program is a strong local-State-Federal partnership, backed up by the participation of professional and voluntary groups.

In particular, we plan to centralize our civil defense activities in a new division in our Bureau of State Services. This division will serve as a focal point for civil defense planning and operations.

In addition, I plan to invite a group of leaders to serve as an advisory committee on health and medical services for civil defense. National leaders in medicine, public health, civil defense, and public affairs will be asked to recommend courses of action for the Public Health Service and cooperating organizations.

As most of you know, a Division of Radiological Health has recently been established within the Service. We expect to draw upon the resources of this division in developing plans for radiation research, training, and protection. Studies in radiation monitoring and exposure and on radioactive fallout levels are already underway. These and similar studies should be of invaluable aid in devising radiological defense measures.

Other units of the Service will participate in civil defense operations which are geared to their normal programs. For example, the sanitary engineering and communicable disease control components of the Service will have primary responsibility for planning and action in their areas of competence. This concept of "built-in" civil defense is logical and desirable for agencies at all levels.

So much for what has been done this year and what the Public Health Service expects to accomplish in the months ahead.

The estimates of damage to this country from nuclear attack are all too familiar. So is the picture of utter chaos that can follow any type of enemy action in modern warfare: nuclear, conventional, biological, or chemical. You know as much of what has been said and written about these horrifying possibilities as I do.

You and I, with every other qualified medical and health worker have the duty to protect, insofar as possible, 175 million Americans from the effects of attack, when and if it comes. If we can disregard for the moment the picture of total war, it may be easier to think realistically of what we must do now, systematically month after month, year after year, in order to live up to our charge.

Interlocking Plans

In many ways, civil defense is an intensely local problem. In the event of enemy attack, individual areas may have to be on their own for weeks, especially if they have not been direct targets and have not sustained casualties. They would undoubtedly be cut off from normal channels of transportation, trade, and communications. Many communities will have to rely on their own resources to an unprecedented extent. They will have to develop a kind of self-sufficiency not within the recent experience of our American communities. They will also have to share their health and medical services with less fortunate areas.

Conversely, therefore, it is not enough to think of civil defense as a local affair. Your town, my town, will receive protection only insofar as the total health and medical resources of the Nation are planned, organized, practiced, and mobilized to come to its defense.

We must work at the basic components of civilian health and medical defense in a series of interlocking plans at local, State, regional, and national levels. These, in turn, will be developed in the same intimate relationship with other components of civil defense, such as communications, transportation, food supply, fire control, rescue, and postattack rehabilitation.

The basic components of civilian health and medical defense are:

- Development of a health and medical care plan, closely tied in with related service and resource plans.

changed signals. There have been gaps in staffs and in funds, and lack of a steady focus in civil defense work.

As a former State health officer, I have shared with you some of the frustrations of the past. There will probably be new ones in the future. We have been and will be confronted by vast and changing needs. Who could have known 2 years ago the challenges that confront us today—the new weapons, the mounting potentialities of warfare? We must be prepared every day to meet the unpredictable, the unknown.

Another Look at Civil Defense

The actions taken in 1958 are designed to correct past deficiencies at the Federal level. New appraisals of potential attack and a thoroughgoing administrative study led to the adoption of two important principles. The first is that the total civilian defense must be considered of equal importance to our military preparedness. The second is that mobilization and defense of civilian resources are inseparable and should be under the supervision of a single organizational unit of the highest stature and authority. This means not only the protection of the population in their local communities but also the management of all resources for production, procurement, and stabilization of the economy in time of war.

A basic concept of this plan is that civil defense functions should be planned and carried out by the Federal agencies best equipped to deal with them. The Office of Civil Defense and Mobilization will provide policy direction and coordination. The Federal agencies will be responsible for program content and operations.

In line with this policy, Governor Hoegh has indicated that broad responsibilities will be delegated to the Department of Health, Education, and Welfare, with the Public Health Service responsible for health and medical care. The delegation of authority, however, has not yet been made. In general we expect that it will include the following types of responsibilities:

- Overall planning and guidance of emergency health and medical services.

- Development of national medical casualty and preventive health services.

- Development of a national emergency water supply plan.

- Training of emergency health and medical personnel.

- Conduct of research in medical and public health emergency measures.

- Continuous evaluation of civilian health and medical resources and requirements.

These broad responsibilities, of course, will encompass such specific areas as radiation surveillance and protection of the civilian population against biological and chemical warfare agents.

In effect, therefore, the Public Health Service will plan and direct the health and medical components of civil defense and defense mobilization at the national level. To do this, we are already developing plans that will make all-out demands upon all of the Nation's health resources, both governmental and nongovernmental. The responsibility for casualty care is a tremendous one. It is the hard core of civilian health defense.

Two other important developments round out the story of this Nation's new look at civil defense in 1958.

The first is the enactment of P. L. 85-606, amending the *Federal Civil Defense Act of 1950*. Among other things, this amendment for the first time authorizes contributions to the States for the administration of civil defense services. State health departments will need to work with their State civil defense directors to see that a proper portion of funds appropriated under this authority is made available for emergency health and medical activities.

The second accomplishment is the issuance by OCDM of the *National Plan for Civil Defense and Defense Mobilization*. Just off the press and now being distributed, this plan is the basic document of civil defense. It sets forth the mission of each level of government and of the individual citizen. Each of us should become familiar with the plan and with its forthcoming annexes, which will cover all the special and auxiliary services essential to civil defense. The Public Health Service will have primary responsibility for developing the annexes on the national medical and health plan, the national

tional inventory of survival-type medical items located at wholesale drug outlets, warehouses, hospitals, and retail drugstores. The information developed from this study, to be completed early in 1959, will point up anticipated shortages of essential items.

Preparedness and survival in war are, of course, closely related to preparedness for natural disasters. Each year, hurricanes, floods, tornadoes, and other misfortunes kill and injure thousands of people, disrupt entire communities, and cause untold destruction of homes and property. Every disaster, every threat of disaster, should be used as a training ground for civil defense operations.

We in health and medical services should take advantage of what Secretary Flemming, in his former capacity as director of the Office of Defense Mobilization, calls the "positive impact" of natural disasters, wherein "the experience of fighting the disaster helps us to create the organizations and learn the techniques needed to fight the much greater disaster of war." By the same token, our capability of handling a hypothetical attack should stand us in good stead in responding effectively to the lesser problems of natural disasters.

Our Year of Decision

The great difficulty in civil defense work is that we are dealing with calculated guesses, with possibilities so awesome that they are difficult to accept. We must overcome our natural reluctance to admit such possibilities. The realities of today's world lead inescapably to

the conclusion that preparedness for civilian defense will be a part of our normal way of life for many years to come. If civil defense is seen as such a continuing responsibility, to be planned for and worked for on its own merits, public health can create and perfect the machinery that will help the people of this Nation withstand an enemy attack, recover from it, and press on.

It is my great concern that the Public Health Service provide a steady stimulus to planning, organization, and action in civil defense throughout the Nation in the months ahead. We, of course, can accomplish very little alone. I am gratified to learn that we shall begin with well-developed plans in many States. I am even more gratified by the action of several major professional organizations, without whom no national emergency health and medical service can be developed. The American Medical Association and the American Hospital Association, for example, both have strong civil defense committees prepared to join in national planning.

We in public health must become more sensitive to civil defense needs and we must develop both the competencies and a focus of organization and action. Civil defense is an interlocking job that calls for our greatest application of ingenuity, perseverance, and leadership. It is a challenge that we must meet now if we are to safeguard the Nation's future. We must make this our "year of decision," in which we chart a course of action to meet whatever emergencies the future may hold.

WHO Report on Health Statistics

The fifth report of the World Health Organization's Expert Committee on Health Statistics (No. 133) deals with the collection of statistics, organization of national committees, personnel training, cancer registers, and health indicators related to standards and levels of living.

A limited number of copies are available from the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

- Activation of the plan by means of a uniform organization and systematic practice in emergency health and medical exercises.

- Continuing training programs so that all health and medical workers will be instructed on new problems and new methods.

- A communications system so that all health and medical workers are kept informed of administrative and other developments.

The specific services which must be developed are closely related to our usual public health jobs: communicable disease control, sanitation, laboratory services, development of health facilities, and special services for mothers, children, and older people. In fact, these usual programs are our first line of health defense in any emergency. Underlying the total plan for civil defense and mobilization is the assumption that civilian health must be maintained and raised to higher levels if the Nation is to meet the stresses of war and withstand enemy attack.

Civilian health and medical defense, however, calls for something more than intensifying our present programs. It requires new organizational relationships and cooperation in a literal sense, that is, operating together. We have many cooperative programs for clearly defined goals. In civil defense, the goal may not be clear, but we must have specific actions at specific times and in specific places. So many physicians, dentists, nurses, engineers, sanitarians, and health educators will be expected to turn out at specific times and locations to carry out the duties they will be expected to perform in the face of disaster. They will be expected to repeat this performance until the response is automatic, smooth, and sure. Such a state of readiness must become a reality in every part of the country.

Every health agency, official and voluntary, every professional society, national, State, and local, should know where and how it can best function in an emergency. In public health departments, plans should be made for a second headquarters in case the first has to be abandoned. There should be well worked out lines of succession in key health jobs to assure continuity of leadership. Provision should be made for safe storage of essential records.

It is assumed that local health authorities are thoroughly familiar with health resources

in their communities. Civil defense planning requires that these resources be known at regional and State levels, and that this knowledge include resources outside the traditional health settings which may be drawn upon for health and medical services in an emergency.

Disaster Resources

Obviously, medical care will have to be provided for casualties. But what measures will be necessary to take care of illnesses when the supply of physicians is severely depleted? when there is an acute, often prolonged, shortage of medical and sanitation supplies? when medical facilities are damaged or greatly overcrowded? How can we handle the problems growing out of a limited food supply?

There is also the vital matter of personnel and training. Emergency planning calls for a nationwide reservoir of professional health manpower trained in civil defense knowledge and skills. We in the Public Health Service plan to work with universities, health agencies, and professional groups in increasing these skills. In this connection, we will work with the program of medical education for national defense under which grants are made to medical schools to incorporate into their curricula the new knowledge of military or civil emergency medicine and public health. Such assistance needs to be expanded both in amount and scope. For example, measures need to be developed for bringing the new knowledge to physicians already in practice, and to the other health professions.

In order to conserve the skills of the health professions in emergencies, the public must also be trained in first aid and home nursing techniques. Professional activities can then be limited to highly skilled tasks and supervision. The public, as well as the professions, must be prepared to live with austerity.

All types of supplies and equipment must be available and ready for use. In the field of health requirements, the Public Health Service will evaluate the needs for essential survival items and develop programs designed to assure these supplies during emergencies, using stockpiling and other reserve build-up measures. The Service already has underway a na-

ders, were gathered together in 1955 into a group now known as the ECHO viruses. The first adenoviruses were reported toward the end of 1953 and early 1954 by Rowe and his co-workers and by Hilleman and his co-workers. The Sendai virus, or the hemagglutinating virus of Japan, recently named influenza D, was first reported by Kuroya and associates in 1953. Other new myxoviruses, the croup-associated (CA) virus, the hemadsorption viruses (HA), the respiratory syncytial virus, or chimpanzee coryza agent (CCA), the salivary gland virus (SGV), and JH and 2060 viruses, have all been reported since 1955 by Chanock, Smith, Rowe, Weller, Price, Pelon, Mogabgab, and their co-workers. The HA viruses were reported by our laboratory only this year.

Clinical Illnesses

Fifteen clinically and epidemiologically distinguishable entities attributable to the newly recognized viruses are listed in the tabulations that follow. When the more specific signs and symptoms are not produced, the illnesses are generally lumped under such nonspecific terms as "common cold," "virus infection," "fever of undetermined origin," and "acute respiratory illness." In the warm months they might be called "summer grippé"; in the cold months "febrile colds."

Enteroviruses

Five clinically distinct entities, namely, herpangina, epidemic pleurodynia, aseptic meningitis, epidemic exanthemata, and myocarditis neonatorum, now well established as Coxsackie and ECHO viral diseases, are listed below together with acute summer respiratory illnesses.

Disease	Viral serotypes incriminated, 1958
Herpangina (vesicular pharyngitis)-----	Coxsackie group A 2, 4, 5, 6, 8, 10 (probably 3)
Epidemic pleurodynia (Bornholm disease)-----	Coxsackie group B 1, 2, 3, 4, 5
Aseptic meningitis (nonbacterial meningitis) ¹ -----	Coxsackie group A 7, 9; group B 1, 2, 3, 4, 5; ECHO 4, 6, 9, (14)

Epidemic exanthemata ("Boston exanthem") ("meningoencephalitis with rash")---	ECHO 9, 10
Myocarditis neonatorum (acute aseptic myocarditis)---	Coxsackie group B 3, 4
Acute febrile respiratory illnesses ("summer grippé") ¹	Many of the new viruses.

¹ These diseases are caused also by other enteroviruses including polioviruses types 1, 2, and 3.

Not only can certain virus types cause different clinical illnesses, but it is also apparent that the same clinical illness, such as aseptic meningitis, can be caused by a number of distinct virus types. Double and even triple simultaneous virus infections add to the complexity of the clinical aspects of these viruses.

Adenoviruses

At least six distinct entities are currently attributable to adenovirus infections. They are the following:

Disease	Adenovirus types implicated	
	Most commonly	Less commonly
Acute respiratory disease-----	4, 7	3, 14
Pharyngoconjunctival fever---	3, 7a	1, 2, 5, 6, 14
Acute febrile pharyngitis-----	1, 2, 3, 5	
Follicular conjunctivitis-----	3, 7a	2, 6, 9, 10
Epidemic keratoconjunctivitis-	1 8	2 3, 2 7a
Virus pneumonia:		
Infants-----	7a	1, 3
Adults-----	4, 7	3

¹ Classic cases.

² Mild cases.

The first clinical illness shown to be caused by adenoviruses was acute respiratory disease (ARD). This common epidemic disease of military recruits is caused most frequently by types 4 and 7. These serotypes rarely occur in children in the United States. Most adults eventually develop antibodies to types 4 and 7.

Pharyngoconjunctival fever (PCF) occurs in children in any month. It is frequently associated with swimming pools and camps. Attributed chiefly to serotypes 3 and 7a, it occurs only sporadically in adults. Many if not most adults have antibodies to these serotypes.

The most common manifestation of adenoviruses is acute febrile pharyngitis due to types 1, 2, 3, and 5 in infants and young children.

70 Newly Recognized Viruses in Man

ROBERT J. HUEBNER, M.D.

THE 1948 textbook, *Virus and Rickettsial Diseases of Man* (Rivers), listed approximately 60 viruses which were known to infect man. Two-thirds of these agents were animal or arthropod agents which involve man only secondarily. Truly human viruses (that is, parasites specific for man and dependent on him for maintenance of their parasitic cycle) recognized in 1948 numbered a mere 20, of which only 9 were established in the laboratory. Ten years later, in 1958, 70 additional, specifically human viruses have been established and studied in the laboratory.

The newly recognized agents are not only numerous but exceedingly prevalent, and in intensely populated urban areas it appears that most humans at one time or another experience most of them. Unlike the viral diseases of man transmitted from other species, these common viruses tend to be milder in their pathogenic activity and only very rarely fatal. This mildness is not unexpected, since they are dependent on man, their natural host, for the perpetuation

of their parasitic existence. Many animal and arthropod viruses which quickly lay the human low produce extremely mild effects in their natural hosts.

The following is the current box score of newly recognized viruses (1958), including polioviruses. For purposes of discussion, the viruses are divided into the enteroviruses and the respiratory tract viruses. This is an arbitrary separation, based on the sites in which the viruses are commonly demonstrated. However, most of the enteroviruses can and do occur in the pharynx, at least during the brief, early stages of infection. Similarly, some of the respiratory tract viruses, particularly the adenoviruses, can be demonstrated in the intestinal tract. One might consider as newly recognized the newer influenzal strains of type A and type B. Influenza C, measles, chickenpox, and herpes zoster have only recently been established in laboratory systems.

Enteroviruses

	Number
Coxsackie:	
Group A-----	19
Group B-----	5
ECHO-----	20

Respiratory tract viruses

Adenoviruses-----	18
New myxoviruses (Sendai, group associated, hemadsorption, types 1 and 2)-----	4
Other viruses (salivary gland virus, JH, 2060, respiratory syncytial)-----	4

70

The first representatives of the Coxsackie viruses were reported by Dalldorf and Sickles in 1948. Subsequently, agents isolated in tissue culture, called orphan viruses by Melnick, and enteric viruses by Sabin, Hammond, and En-

Dr. Huebner is chief of the Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases of the Public Health Service. This article is a condensation of a paper presented for the Institute of Microbiology, Rutgers University, in a symposium sponsored by Gustav Stern, president of Hartz Mountain Products, in honor of the late Dr. F. R. Beaudette, who was chairman of the department of animal pathology, Rutgers University College of Agriculture. It is printed with permission of Rutgers and John Wiley and Sons, Inc., publisher of the book in which the full version of the paper will appear, Perspectives in Virology, edited by Morris Pollard. Publication of the book is scheduled for next month.

Pneumonitis in infants and children -----	Sendai (Influenza D), CCA, IIA type 1
Mild respiratory illness (common cold, coryza, nasopharyngitis) -----	JH, 2060, CCA
Acute febrile respiratory illnesses -----	Sendai, CA, IIA types 1 and 2
Cytomegalic inclusion disease -----	Salivary gland virus

Chanock and associates showed a temporal association of the new respiratory syncytial virus with such pneumonitis in infants and children. This virus was shown to be identical with the chimpanzee coryza agent (CCA) reported earlier by Morris and associates. This virus, like the croup-associated virus, appears to occur in sharply localized epidemics.

Two viruses with similar properties, JH virus and 2060 virus, were reported almost simultaneously from two separate laboratories, in association with mild respiratory illnesses with very low-grade fever. Subsequently, Price has reported protection against an outbreak of mild respiratory disease in children with a vaccine prepared against the JH strain.

The virus causing cytomegalic inclusion disease, so termed because of the distinctive giant intranuclear inclusions produced, is, in a sense, an old virus in that it was recognized as a pathological entity many years ago. This virus, however, was not isolated and established in the laboratory until 1956, when Smith reported its recovery in human uterine fibroblasts. Shortly afterwards, Rowe, Hartley, and I, as well as Weller, reported in some detail on the occurrence of this virus in man. It would appear that the salivary gland virus, as it is also known, is an extremely common and ubiquitous agent in man. Related but species-specific representatives occur in many other mammals. The mouse and guinea pig varieties have also been established in tissue culture.

This group of viruses occasionally causes disseminated disease with lesions observed in nearly all the critical organs in the species in which they occur. The human agent in its active form in newborn infants, called cytomegalic inclusion disease, is frequently fatal. Weller and Rowe recently showed that the virus can be demonstrated for long periods in salivary secretions and in urine of infected children.

Like adenoviruses, the human agent has been unmasked from long-term cultures of tonsils and adenoids.

The search for human viruses has demonstrated previously unrecognized viruses in other species as well. At least 20 newly recognized viruses have been demonstrated in tissue cultures of monkey kidneys. Some are biologically and immunologically related to human adenoviruses, others to human ECHO viruses, and others to the newer hemadsorption myxoviruses.

Implications

Recognition of so many new viruses and their effects cannot fail to provoke a reexamination of current concepts. It is a familiar observation that the usefulness of hypotheses concerning the etiology of disease depend in great part upon whether or not they can be tested. When they are based on a microbial theory, this necessary and desirable circumstance usually obtains. But such testing is not always easily accomplished.

One of the most important implications of so many new, different, and prevalent viruses is the complexity of the business of trying to find out what they are doing in their hosts. Simultaneous infections with multiple viruses are commonplace, particularly in young infants. We have observed as many as four acute viral infections in the same child during the same week. Since, in very young children, these new viruses most often cause clinical entities that are difficult to distinguish from one another, attributing the illness to the proper agent can be quite difficult. The elucidation of significant etiological associations of prevalent viruses which only rarely cause fatal infections becomes, as a consequence, almost a problem in logistics, requiring carefully planned, extensive, and controlled epidemiological and laboratory studies. One of the more proximate and important implications of modern research on virus diseases, therefore, is that it will cost significantly more money than microbiological studies have in the past.

Clinical Importance of New Viruses

Specific clinical illnesses attributable to viruses may represent only a small proportion

Most are infected with types 1 and 2, it would appear, prior to entering grade school. These febrile illnesses are much more common in cold seasons. They are quite similar to pharyngoconjunctival fever, except that conjunctival inflammation is rare. Common follicular conjunctivitis without fever, due to adenoviruses, is seldom epidemic. It is observed most often in adults, since in children adenoviruses tend to produce fever, in which case the illness would more properly be called pharyngoconjunctival fever.

Epidemic keratoconjunctivitis (EKC) appears to be most commonly caused by type 8 adenovirus. It occurred chiefly in industrial areas during World War II. EKC is prevalent in Japan and has recently been observed in Scotland and in continental Europe. When type 8 infections are observed in children, as in Japan, the illness tends to resemble pharyngoconjunctival fever; in adults, the infection usually results in classic afebrile keratoconjunctivitis.

Other adenoviruses (types 3 and 7a) can also on occasion cause mild keratitis expressed as subepithelial opacities which, according to Thygeson, are distinguishable from the severe and prolonged classic EKC, which not infrequently is followed by permanent corneal damage.

Primary atypical pneumonia without cold agglutinins was found associated with adenovirus infections, chiefly type 4, by Hilleman and Werner. This illness is invariably associated with outbreaks of ARD. Virus pneumonia in infancy is the most recent illness shown to be caused by adenoviruses. Type 7a was demonstrated repeatedly during an epidemic of virus pneumonia in infants in Paris, 1955-56. The findings in fatal cases resembled very closely an unusual pneumonia described by Goodpasture in 1938, which featured intranuclear inclusions quite similar to those produced by adenoviruses in cells grown in tissue culture. Types 1 and 3 have also been found in the tissues of children dying from pneumonia in this country.

As illustrated in the tabulation, certain adenoviruses can also cause clinically different illnesses, and the same illness may have multiple adenovirus causes.

Myxoviruses

The myxoviruses, particularly influenza, mumps, and Newcastle, are probably the most intensively studied of the animal viruses. In recent years, however, new human myxoviruses have been found, with properties differentiating them from the older varieties. In 1955, outbreaks of infant pneumonitis were associated with a new myxovirus called Sendai virus, isolated so far, only in Sendai, Japan, and in Vladivostok, Russia. However, serologic reactions to Sendai virus in this country, England, and elsewhere, suggest that Sendai virus or an immunologically related virus was causing prevalent infections.

In 1954, Chanock reported a croup-associated virus. When propagated in monkey kidney tissue culture, CA virus revealed minor serologic relationships to mumps and to Sendai virus. The hemadsorption myxoviruses types 1 and 2, discovered not many months ago by Chanock and others of my associates at the National Institutes of Health, in collaboration with Dr. Robert Parrott, physician-in-chief, Children's Hospital, Washington, D. C., are also isolated in monkey kidney tissue cultures, but they require the new hemadsorption technique, described by Vogel and Shelokov, for their demonstration. These agents appear to be responsible for a significant amount of acute febrile respiratory illness in children in urban areas.

Our recent hospital clinic studies, done in collaboration with Children's Hospital, Washington, D. C., and the District of Columbia Welfare Department, indicate that types 1 and 2 hemadsorption viruses were responsible for as much as 25 percent of the influenza-like illnesses observed during recent months in children. Retrospective studies indicate that the hemadsorption viruses may have been responsible for a relatively high proportion of respiratory illnesses in children, at least since 1953, and may have caused in military recruits a proportion of acute respiratory disease not accounted for by the streptococci, influenza virus, or the adenoviruses. The following shows the illnesses associated with newly recognized myxoviruses and other respiratory tract diseases:

Acute laryngo-tracheobronchitis (croup) ----- CA, HA type 2

At the National Institutes of Health, we are engaged in preliminary tests of properly constituted viral vaccines. Our studies of the high prevalence of viral illnesses in children suggest that a properly constituted, safe, and effective vaccine would probably be incorporated in pediatric immunization schedules. Such a vaccine would require perhaps as many as 25 separate viral antigens.

Speculation concerning the eventual utilization of this hypothetical "virus cocktail" is premature. Too many questions remain to be answered. Some may feel that such a vaccine would be fraught with unexpected hazards either immediately or later in life. Others may assume that such a vaccine would be of immediate great value. Generally speaking, the first vaccines for any disease are poorer than the modifications that come later. However, it is important to take the initial steps, carefully, of course, and then to answer questions as they become real rather than merely hypothetical.

The justification for study and eventual use of an all-purpose virus vaccine ought not to be put purely on an economic basis. I believe that a multivalent vaccine capable of preventing as much as 25-30 percent of undifferentiated respiratory disease, particularly in early childhood, would be desirable for the good and simple reason that this is, in any vocabulary, an enormous mass of illness, probably much more illness than is now prevented by all currently available vaccines.

New Viruses and Noninfectious Disease

It has been only a few years since our chief infectious diseases were pneumonia, smallpox, diphtheria, and the great plagues, the latter mostly transmitted from other animal species to man. Although vigilance is still required to keep them in check, they are no longer regarded as important, at least in this country.

This remarkable success story has led to an unfortunate myth that infectious disease research is now a comparatively dead science. Nevertheless, numerically speaking, it would appear that most of Western man's microbial experiences, as exemplified in large part by the newly recognized virus flora, still remain to be defined, if not eliminated.

Many chronic and degenerative diseases also

remain largely a riddle as to ultimate causes. Among the various hypotheses, those which postulate viral etiology deserve consideration. As viral infections are most frequent precisely during the formative periods, they frequently affect organs that are critically necessary for healthy growth. Despite the fact that the newly recognized and numerous human viruses are almost never fatal, the astronomic number of illnesses they cause seems to me to imply a great deal. Our knowledge of the pathogenic behavior of these viruses rests on comparatively few autopsies. But from studies of these few fatal cases, it is quite clear that many representatives of the new and common viruses cause pathology in critical organs, including the central nervous system, lungs, heart, liver, adrenals, kidneys, and the reticuloendothelial system. It is almost impossible to think that these pathological effects are not duplicated, to a lesser extent, in many nonfatal infections.

The well-known virus diseases of early childhood, measles, mumps, chickenpox, herpes, and poliomyelitis, also cause pathology in central organs with uncomfortable frequency. No fewer than 14 Cocksackie and ECHO viruses have now been shown to affect the central nervous system. Certain enteroviruses also cause myocarditis and pericarditis in children. It is quite possible that repeated infections in childhood with specifically human viruses which affect the central nervous system represent far greater contemporary threats to human health than all the viral encephalitides transmitted from nature combined.

Consider also the salivary gland virus, a notorious cause of neonatal death, and, as recently demonstrated by Weller and Rowe, a potential cause of chronic cerebral disease in infants who survive the early perinatal infection. In fatal cases, this virus causes lesions in virtually all the critical organs; it has been shown to be excreted by as many as 10 percent of infants under the age of 3; and serologic surveys show that it eventually succeeds in producing infectious processes in perhaps as many as 80 percent of all persons by the time they reach 35 or 40. Furthermore, the infection is persistent and has been reported occasionally as a generalized recrudescence disease in fatal illnesses, usually attributed to other chronic maladies. It is un-

of the total amount of illness they produce. Our studies, as well as those of Dingle's group at Western Reserve University and the Newcastle-on-Tyne studies in England, show that the common respiratory and other undifferentiated illnesses tend to occur most frequently in the young child. In this age group, it is difficult even for a pediatrician to distinguish among the illnesses most commonly caused by the adenoviruses, Coxsackie, ECHO, and even polioviruses.

The 6-year longitudinal study of suburban communities, by Bell and my other associates at the National Institutes of Health, showed that respiratory illnesses characterized by mild fever of more than 1 day's duration occurred approximately 5 times more often in children under 6 years of age than in persons over 17. The intermediate age group showed an intermediate experience. For this reason, our recent studies of these illnesses have been focused on the childhood illnesses in three different population groups: (a) in the suburban community, (b) in pediatric hospital wards and clinics, and (c) in infants and young children confined to an orphanage nursery. By longitudinal and cross-sectional observations, we hope to determine more precisely the roles of viruses, and other pathogens as well, in producing the common acute and undifferentiated illnesses in children.

Already these studies have led to interesting findings. For instance, in collaboration with Dr. Robert Parrott, our group is now engaged in studying the relative contributions of Asian influenza, the brand-new hemadsorption viruses, and the adenoviruses to current pediatric respiratory illnesses in local pediatric clinics and hospital wards. During October and November 1957, approximately 60 percent of the acute respiratory illnesses could be attributed to Asian influenza and approximately 25 percent to types 1 and 2 hemadsorption viruses. The adenoviruses, the croup-associated virus, the respiratory syncytial virus, as well as Coxsackie and ECHO viruses, known to be prevalent at other times and places, were not prevalent during this period. Because of technical difficulties, we have been unable thus far to assay the contributions of JH and 2060 viruses.

During October and November, we were able to account for the majority of the respiratory illnesses on the basis of Asian influenza and the new hemadsorption viruses. In December 1957, when the Asian influenza virus disappeared entirely from the clinic and hospital wards, approximately 25 percent of respiratory illnesses could still be attributed to the hemadsorption viruses. The adenoviruses appeared in December and were held responsible for approximately 5 percent. Of the respiratory illnesses observed for about 60 days, these two agents produced 30 percent.

Asian influenza reappeared in February, but only a small percentage of illnesses were attributable to this virus. In late February, type 1 hemadsorption virus disappeared. At this time, we were able to account for probably less than 15 percent of the acute respiratory and undifferentiated illnesses. Subsequently the hemadsorption virus reappeared and adenoviruses became more common, but large segments of respiratory disease remained unexplained. Since bacteriological studies have provided no explanation for the vast majority of unexplained illnesses, additional, presumably new, viruses will have to be sought.

Longitudinal studies in an orphanage nursery have provided us with observations on thousands of respiratory and undifferentiated illnesses. Thousands of virus isolates were obtained and, for the most part, identified. (The data are being prepared for publication.) At least 35 to 40 different prevalent viruses occur regularly in this population, and substantial amounts of illnesses can be attributed to the adenoviruses, some of the enteroviruses, and myxoviruses. During nearly 3 years of observation since 1955, many of these viruses have made periodic, almost predictable, reappearances at appropriate seasons. However, even under intensive scrutiny, many illnesses still cannot be identified as viral or bacterial infections.

Prophylactic Vaccines

Even though there are still many common respiratory and other undifferentiated diseases with no known agent, serious consideration should be given to the development of prophylactic viral vaccines.

Local Health Departments

GROWTH or ILLUSION?

BARKEV S. SANDERS, Ph.D.

STUDENTS of public health as well as civic leaders have begun to scrutinize the efficacy of the traditional pattern of local health departments (1-3). A critical look at the growth of these departments in recent years is therefore timely.

The growth of local health departments may be measured in several ways, each way possibly leading to a different conclusion. When independent approaches lead to common conclusions, however, we are justified in having greater confidence in the findings. We have chosen three methods of measuring the growth of local health departments in recent years:

- Extent of geographic areas covered by local health departments.
- Annual expenditures of local health departments.
- Number and skills of full-time local public health personnel.

Geographic Coverage

A few large cities in Europe and in the United States had developed municipal health departments even before the 19th century, but the

Dr. Sanders is technical consultant, Program Development Branch, Division of General Health Services, Public Health Service. The article is based on a speech given at the annual conference of the Nebraska State Public Health Association in Lincoln, September 23, 1957. Basic data on the areas, expenditures, and personnel were compiled under the direction of Clifford H. Greve, State Grants Branch, Division of General Health Services.

countywide local health department in this country is exclusively the product of the 20th century. According to Williams (4): "There are conflicting claims as to where the first full-time county health department was established. The records indicate that Jefferson County, in which the City of Louisville, Kentucky, is situated, established a full-time health department in 1908. In Guilford, North Carolina, a full-time county health department was established in 1911."

In 1915 there were 15 full-time county health departments; by 1930 this number had risen to 534 (5). Since these early beginnings, both the number of separate health units and the number of counties with such health units have vastly increased.

The period of greatest growth of full-time local health organizations was between the years 1915 and 1940 (table 1). Since 1950 there have been relatively few additions. The yearly number of counties with organized health departments and the percentage of population included in areas with such departments underscore this conclusion.

Although the rate of expansion in area and in population covered since 1950 has been negligible, this need not mean that local health departments have not grown in other respects: in quality and in scope of services. We, therefore, should look at other indexes of growth.

Annual Expenditures

From 1947 to 1956, expenditures through local health departments rose almost constantly. Al-

reasonable to think that the giant intranuclear inclusions produced by the generalized disease are confined to fatal cases. This and other latent viruses may have outstanding importance for those suffering from a lack of testable hypotheses concerning ultimate causes in certain chronic diseases.

Viruses in Etiology of Human Cancer

It has become clear that the viruses responsible for animal tumors are not altogether strange microbes. Recent studies have shown that the animal tumor viruses grow to high titer, that they produce antibodies, and that some of them grow in tissue cultures. Their manifestations are generally hyperplastic rather than cytolytic and the viruses frequently remain latent for many months; but these are not unusual properties. Only their oncogenic activities set them apart. The methods for working with them appear to be slightly more difficult than those for some of the ordinary, non-tumor viruses, yet they seem to present no more severe technical problems than, for example, the salivary gland viruses.

The delineation of certain viruses in one species has frequently been based upon studies of similar viral experiences in other species. When representatives of various families of human viruses turn up in animal species other than man, it is merely taken for granted. In the same way, it is not uncommon for the first representatives of a virus family to be found in an animal species, then, subsequently, related representatives to be found in man. It is hardly possible for a virologist to think that family relatives of the numerous tumor viruses of animals will find no expression in the human species. To say that such a virus has never been demonstrated is quite correct. It is equally correct to say, however, that the critical experiments which have been necessary for the demonstration of animal cancer agents in man have not yet been performed. In fact, the question "Do viruses cause human cancer?" has not yet been effectively asked. One of the major implications of modern virus research, therefore, is based on the likelihood of an early answer to this most important medical question.

Regular Corps Examinations

The Public Health Service announces competitive examinations for appointment of physicians, dentists, sanitary engineers, clinical psychologists, biochemists, and veterinarians to its commissioned corps as Regular Corps officers.

The examinations will be held throughout the country on March 31 to April 3, 1959, for the veterinarians and on April 21-24, 1959, for the other categories.

Appointments will be made in the ranks of assistant and senior assistant grades, equivalent to Navy ranks of lieutenant (j.g.) and lieutenant, respectively. Active duty as a Public Health Service officer fulfills the obligations of Selective Service.

Only United States citizens need apply and applicants must be at least 21 years old. The entrance pay is \$4,817 per year for an assistant grade officer with dependents and \$6,270 for a senior assistant grade officer with dependents. Physicians, dentists, and veterinarians receive an extra \$1,200 to \$3,000 a year incentive pay.

Applications for the veterinarian's examination must be received by the Surgeon General no later than February 20, and March 6 for the other categories. Forms may be obtained by writing to the Surgeon General, Public Health Service (P), Washington 25, D. C., or to the nearest field station of the Service.

Table 2. Annual expenditures by local health departments, by source of funds, 1947-56

Fiscal year	Total expenditures	Local	State	Federal	Private agencies
1947-----	\$79,876,248	\$53,754,050	\$10,270,597	\$15,180,501	\$671,100
1948-----	91,961,827	60,721,017	18,983,560	14,533,657	723,593
1949-----	119,072,580	75,187,589	27,167,203	15,510,442	1,207,346
1950-----	120,353,884	83,274,189	23,337,890	13,131,921	609,884
1951 ¹ -----	149,773,696	101,254,064	30,871,575	13,644,760	1,003,297
1952 ² -----	140,781,739	96,766,232	30,275,193	13,131,255	609,059
1953-----	144,317,326	97,370,388	33,620,667	12,500,517	825,754
1954-----	156,428,593	107,995,360	37,742,355	9,614,786	1,076,092
1955-----	166,130,010	117,988,156	38,100,197	8,916,907	1,124,750
1956-----	177,427,328	127,163,949	40,232,633	³ 9,046,488	984,258

¹ Three-fourths of increase between 1950 and 1951 attributed to four States: New York, Michigan, Ohio, and Pennsylvania. Increased expenditure was sizable in some of the large cities in the first three States, and more complete reporting of expenditures was noted for Pennsylvania. Some increase was shown, however, for most States.

² Although increases between 1951 and 1952 were reported by many States, sizable reduction in funds expended was reported for Detroit and for New York City. The decrease in Detroit resulted from the elimination of general hospitalization cost. Apparently, reported expenditures were incomplete for New York City for 1952.

³ Federal poliomyelitis funds eliminated for reasons of comparability.

SOURCE: As reported to the Public Health Service by State health departments and other State agencies participating in grant programs administered by the Public Health Service. Prepared by the State Grants Branch, Division of General Health Services, Public Health Service.

tained by applying these two indexes to the actual expenditures given in table 2. The top part of table 3 shows what the annual amounts would be after having been deflated by the Consumer Price Index; the lower part, the amounts after further adjustments to allow for population increases.

Both sets of figures are smaller, of course, than those based on current dollars in table 2. The total, deflated by applying the Consumer Price Index only, shows a 30 percent increase instead of the 47 percent increase in table 2. In terms of deflated dollars the increase in local funds was 35 percent instead of 52 percent and in State funds 52 percent instead of 72 percent. Expenditures of Federal funds by local health departments declined 39 percent in deflated dollars compared with 31 percent in terms of current dollars.

As would be expected, adjustments for population increases reduce the expenditure figures even more. The deflated dollars in table 3 show increases of 14 percent for total expenditures, 19 percent for expenditures of local funds, and 34 percent for expenditures of State funds, and a decrease of 47 percent in expenditures of Federal money.

Although deflation by the Consumer Price Index reduces the slope of the increase in expenditures, the slope still shows some increase.

The question arises whether this index adequately equates the purchasing power of dollars spent for public health. The Consumer Price Index will reduce dollars expended to a common base only if the items purchased are the same commodities and in the same proportions on which the index was based or are closely correlated with these. We know that few local health department dollars are spent for food, clothing, and housing, items which constitute almost three-fourths of all expenditures in the Consumer Price Index. It follows therefore that the use of this index to equate the purchasing power of local health department dollars may not be appropriate. In spite of the deflated amounts obtained by the application of the index, we may still be comparing dollars of unequal purchasing power in different years for the kind of things that were purchased by local health departments.

Deflating Expenditures by Wage Index

The bulk of local health department expenditures is for personnel. Emerson found that in 1942 the total expenditures of local health departments were \$77.3 million, of which \$62.7 million, or 81 percent, was spent for salaries (6). There is no ready-made index as to what adjustments should be made in dollar values

though there was some slackening in the rate of increase, the year-to-year changes in total expenditures were generally upward (table 2).

From 1950 to 1956 total expenditures increased 47 percent, averaging about 8 percent per year. Local funds, which constituted two-thirds of the total, increased 52 percent, closely paralleling the increase in total expenditures. Although fewer dollars are involved, the percentage rise in State funds expended by local health departments (72 percent, or about 12 percent a year) was significantly greater than either the total or local increases.

Within this same period, there was a marked decline (31 percent) in the Federal portion. In 1947 Federal funds represented 19 percent of all local public health expenditures; by 1956 this percentage had dropped to 5.

The casual observer, noting the rise in dollar amounts spent for health programs, may assume that community health needs are being taken care of more adequately today, at least

in the areas served by full-time health departments. This presumption is subject to question, however, since the increases occurred in a period of rising costs, when the purchasing power of the dollar was steadily declining.

Equating the Value of the Dollar

Ordinarily, the economist uses the Consumer Price Index of the Bureau of Labor Statistics in order to convert current dollars into uniform dollars. For most purposes this provides a reasonably adequate adjustment.

The Consumer Price Index uses as its base the prices paid for consumer goods and services purchased by wage earners' families in the period 1947-49. Appraisal of the significance of increases in dollar amounts should also include an adjustment for the population increase in counties served by local health departments in terms of an index reflecting this increase.

The expenditure figures in table 3 were ob-

Table 1. Comparison of coverage of the United States by full-time local health departments for selected years¹

Year	Organized areas				Unorganized areas	
	Number of organizations	Number of counties included	Population covered	Percent of total population covered	Population represented	Percent of total population in unorganized areas
1915		² 15				
1935	886	² 762	74, 133, 331	56. 3	57, 535, 944	43. 7
1940		² 1, 577				
1941		² 1, 668		² 70. 0		² 30. 0
1942		² 1, 828		² 75. 0		² 25. 0
1946		³ 1, 851				
1947	1, 284	1, 874	113, 501, 778	81. 5	25, 715, 485	18. 5
1949	1, 342	2, 010	121, 994, 500	83. 5	24, 118, 500	16. 5
1950	1, 348	2, 088	129, 073, 144	86. 1	20, 782, 448	13. 9
1951	1, 353	2, 105	129, 600, 000	86. 0	21, 064, 000	14. 0
1952	1, 383	2, 184	136, 536, 806	88. 4	17, 882, 593	11. 6
1953	1, 365	2, 197	137, 873, 978	88. 4	18, 056, 105	11. 6
1954	1, 434	2, 218	141, 682, 700	88. 7	17, 995, 800	11. 3
1955	1, 442	2, 204	144, 604, 600	88. 9	18, 004, 900	11. 1
1956	1, 446	2, 209	147, 147, 400	88. 7	18, 672, 100	11. 3
1957	1, 437	2, 274	⁵ 150, 500, 000	⁵ 88. 8	⁵ 19, 000, 000	⁵ 11. 2

¹ Data from the State Grants Branch, Division of General Health Services, Public Health Service, including all State health districts, with additions for early years by the author.

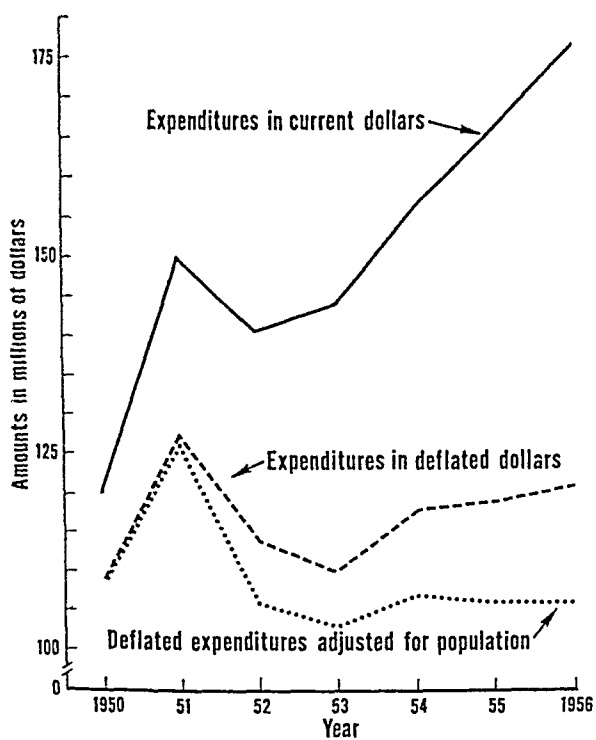
² Kratz, F. W., Status of Full-time Local Health Organization at the End of the Fiscal Year, 1941-42, Pub. Health Rep. 58: 345-351, Feb. 26, 1943.

³ Mountin, J. W., Hankla, E. K., and Druzina, G. B., Ten Years of Federal Grants-In-Aid for Public Health, 1936-46, Public Health Bulletin No. 300, Public Health Service, 1951.

⁴ The difference between 1949 and 1950 is due partly to adjustments made possible by current population figures for 1950 provided by the 1950 census.

⁵ Estimated.

Figure 1. Annual expenditures by local health departments compared with expenditures deflated by wage and salary index and by population increase, 1950-56.



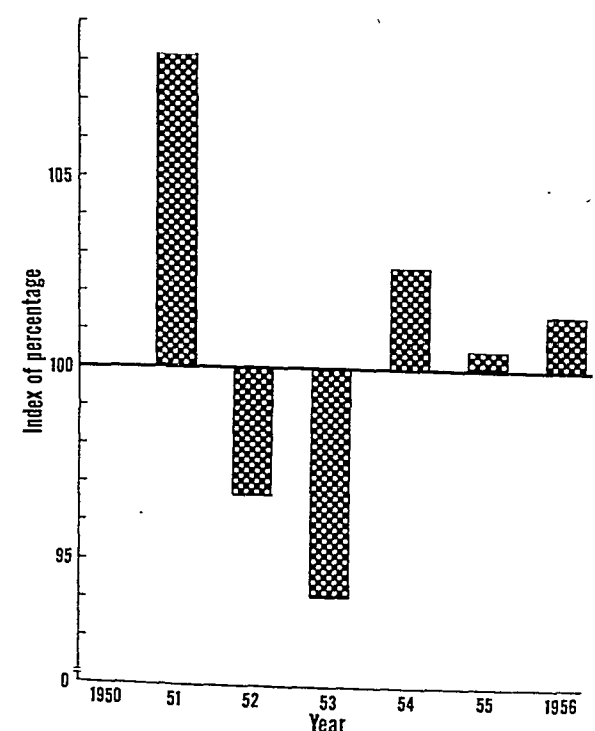
the disparity between the expenditures in 1951 and 1952 may not be real, as explained in footnote 2 of table 2. Excluding this one year, however, the maximum increase between the lowest and the highest year is only 10 percent. Local funds parallel the total closely since they constitute the largest component. The State funds follow an even less consistent pattern of growth, the highest expenditure occurring in 1954. Federal funds declined progressively until by 1956 they were about half of the amount available in 1950.

The figures in the lower part of table 4, if one considers the population increase in counties with organized health departments in addition to adjusted dollar values, indicate an actual decline in "real" expenditures between 1950 and 1956. The effect of these two adjustments is depicted also in figure 1.

Percentage of Gross National Product

The relative growth or decline of interest in a public endeavor can be appraised by the por-

Figure 2. Index of annual expenditures by local health departments as percentage of gross national product, using 1950 as the base, 1950-56.



basic data, to relatively large increases in appropriations by four States, New York, Michigan, Ohio, and Pennsylvania. Furthermore,

Table 5. Annual expenditures by local health departments, 1950-56, as percent of gross national product¹ and index of these percentages, using 1950 as the base

Year	Expenditures as percent of gross national product	Index of ratio of expenditures to gross national product
1950	0.422	100.0
1951 ²	.456	108.1
1952 ²	.408	96.7
1953	.397	94.1
1954	.433	102.6
1955	.424	100.5
1956	.428	101.4

¹ Value of all goods and services produced by the Nation in a given year.

² See table 2, footnotes 1 and 2.

Source: U. S. Office of Business Economics, Survey of Current Business (National Income Number) 37: 8-9 (table 2), July 1957.

Table 3. Annual expenditures by local health departments by source of funds, deflated by the Consumer Price Index¹ and by the population index,² 1950-56

Year	Source of funds (in millions of dollars)				
	Total expenditures	Local	State	Federal	Private
Deflated by the consumer price index only					
1950----	\$117.1	\$81.0	\$22.7	\$12.8	\$0.6
1951 ³ ----	134.9	93.9	27.8	12.3	.9
1952 ³ ----	124.0	85.2	26.7	11.6	.5
1953-----	126.1	85.1	29.4	10.9	.7
1954-----	136.3	94.1	32.9	8.4	.9
1955-----	145.1	103.0	33.3	7.8	1.0
1956-----	152.7	109.4	34.6	7.8	.9
Deflated by the consumer price index and by the population index					
1950----	\$117.1	\$81.0	\$22.7	\$12.8	\$0.6
1951 ³ ----	134.9	93.9	27.8	12.3	.9
1952 ³ ----	117.0	80.4	25.2	10.9	.5
1953-----	117.9	79.5	27.5	10.2	.7
1954-----	123.9	85.6	29.9	7.6	.8
1955-----	129.6	92.0	29.7	7.0	.9
1956-----	133.9	96.0	30.4	6.8	.8

¹ Prices paid for consumer goods and services purchased by wage earners' families in the period 1947-49 equals 100.0.

² Population in counties with full-time health departments using 1950 as the base (100.0).

³ See table 2, footnotes 1 and 2.

SOURCE: Population covered taken from table 1. Consumer price index data taken from Consumer Price Index, U. S. Bureau of Labor Statistics, table 1, p. 2, July 1956; table 1, p. 2, July 1957.

to give uniform purchasing power for the types of expenditures for which local health department dollars are used. Since well over 80 percent of these expenditures are for wages and salaries of employees, an index based on wages of public health workers for the different years would largely meet the need. However, up-to-date information for such an index is not readily available. The latest publication giving information of this type was for 1953 (7). A more readily available measure—more conservative and yet not too far removed from the appropriate index—would be one based on the annual earnings of full-time equivalent workers (8). The index derived, with 1947-49

as the base, is as follows: 110, 118, 125, 131, 134, 140, and 147, for the years 1950 through 1956, respectively.

Table 4 first shows local health department expenditures equated in terms of wages paid in different years to equivalent full-time workers. The figures in the lower half of the table result from an additional adjustment for population increases in counties with full-time health departments.

Total expenditures by local health departments have increased very little in terms of uniform wage dollars. The highest expenditure was for 1951, primarily due, as indicated by

Table 4. Annual expenditures by local health departments by source of funds, deflated by a wage and salary index¹ and by the population index,² 1950-56

Year	Source of funds (in millions of dollars)				
	Total expenditures	Local	State	Federal	Private
Deflated by a wage and salary index only					
1950----	\$109.4	\$75.7	\$21.2	\$11.9	\$0.6
1951 ³ ----	126.9	88.3	26.2	11.6	.8
1952 ³ ----	112.6	77.4	24.2	10.5	.5
1953-----	110.2	74.3	25.7	9.5	.6
1954-----	117.6	81.2	28.4	7.2	.8
1955-----	118.7	84.3	27.2	6.4	.8
1956-----	120.7	86.5	27.4	6.2	.7
Deflated by a wage and salary index and by the population index					
1950----	\$109.4	\$75.7	\$21.2	\$11.9	\$0.6
1951 ³ ----	126.9	88.3	26.2	11.6	.8
1952 ³ ----	106.2	73.0	22.8	9.9	.5
1953-----	103.0	69.4	24.0	8.9	.6
1954-----	106.9	73.8	25.8	6.5	.7
1955-----	106.0	75.3	24.3	5.7	.7
1956-----	105.9	75.9	24.0	5.4	.6

¹ Average annual wages and salaries of equivalent full-time employees using the data for 1947-49 as the base (100.0).

² Population in counties with full-time health departments using 1950 as the base (100.0).

³ See table 2, footnotes 1 and 2.

SOURCE: U. S. Office of Business Economics, Survey of Current Business (National Income Number) 37: 20 (table 27), July 1957, for 1952 through 1956. For earlier years, data were obtained from: U. S. Office of Business Economics, National Income, 1954 Edition, A Supplement to the Survey of Current Business.

the Nation. This differential increase between 1950 and 1956 was about 3 percent. If the indexes in table 5 were adjusted accordingly, it would indicate that the per capita share of gross national product spent by local public health departments declined slightly between 1950 and 1956.

The general inference that we draw is this: Since 1950 there has been no upward trend in real expenditures by public health departments, and, if the increase of population is taken into consideration, there has been perhaps a slight decline. The decline, nevertheless, may be poignant because it occurred in years of unrivaled economic prosperity and in years when particular segments of our population, children and the aged, who stand to gain most from organized public health efforts, were increasing at an appreciably higher rate than the population at large.

We may examine now, by way of a check, the number and kinds of personnel serving local health departments.

Personnel in Local Health Departments

The *raison d'être* of local health departments is to supply directly or otherwise specified health services needed by individuals, families, and the community. The nature and volume of these services may be judged from the number and kinds of personnel employed. Table 6 provides data on full-time personnel for the period 1949 through 1957. Data are not available on the number of part-time personnel employed by local health departments nor on the extent to which these workers have increased or decreased since 1950.

The overall increase of local health department personnel between 1949 and 1957 is 5,394, which is 16 percent, or about 2 percent per year on an average. Since the increase in population in areas served by local health departments during this period has been about the same, one can assume that there has been no per capita increase of service personnel.

An actual decline has occurred in certain types of key personnel in local health departments. Declines in the number of physicians between 1949 and 1957 are observed even without considering the population increase.

Actual declines are observed also in the number of laboratory personnel. Most of the other positions show net gains that are reversed when full-time personnel positions are related to the population increases. One marked exception to this is the small but sharply growing group of medical and psychiatric social workers who more than doubled in number during the interval between 1949 and 1957. The dentists are a second exception. This group is small, but showed an increase of 31 percent between 1949 and 1957.

Summary and Conclusion

Analysis of three criteria of growth, geographic expansion, annual expenditures, and number of full-time health department employees, leads to the conclusion that there has been no growth in local health departments since 1950. In fact, if the population increase in the areas with local health departments is taken into consideration, there is indication of a small decline. This could mean that other agencies are taking over certain needed health services, or that American communities are not so much interested in health, or perhaps health needs that can be dealt with effectively by local health departments have diminished.

Further research is needed to ascertain which of these factors, or in what combinations these or perhaps still other factors, may account for the apparent lack of growth in local health departments. Even more fundamental research is required into methods of reexamining our objectives and determining priorities for local health departments to keep in tune with the times in a rapidly changing society. Also, more precise and objective methods of measuring accomplishment need to be devised in order to learn how best to apportion available funds for local health services in different communities with varying needs and resources.

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tion of resources that the community diverts to the activity. To obtain such a measure, the monies spent each year by local health departments may be related to the gross national product.

The gross national product is the measurement in terms of current dollar values of all the goods and services produced by the Nation in a given year. What proportion of this total is allocated to public health services provided by local health departments? More specifically, has this proportion increased, decreased, or remained more or less stationary during the years 1950 through 1956?

These relationships are shown in table 5. Expenditures by local health departments between 1950 and 1956 were less than one-half of 1 percent of the gross national product.

The largest increase occurred in 1951, but this apparent increase has already been somewhat discounted. Other year-to-year variations are well within the estimation errors present in all these data (table 5 and fig. 2). Ignoring the sharp increase in 1951, one is led to conclude that since 1950 there has been no significant increase in expenditures by local health departments.

In considering percentage of gross national product, we need no special adjustment for the increase in population since the gross national product already reflects population changes. Nevertheless, there might be need for additional adjustment for population in terms of the differential increase of the population in areas with full-time health departments compared with the increase of the population for

Table 6. Number of full-time public health workers of different classifications reported by local health departments for designated years ¹

Class of personnel	1957	1956	1955	1954	1953	1952	1951	1949	Difference 1957-49
All types-----	38, 949	38, 383	38, 131	37, 514	37, 036	35, 997	34, 895	33, 555	5, 394
Physicians-----	1, 431	1, 488	1, 482	1, 482	1, 502	1, 486	1, 594	1, 609	-178
Public health nurses-----	12, 956	12, 900	12, 783	12, 574	12, 492	12, 045	11, 843	11, 251	1, 705
Clinic nurses-----	633	581	612	564	621	631	(²)	(²)	(²)
Dentists-----	281	262	251	236	234	248	233	215	66
Dental hygienists-----	377	370	375	367	388	384	(²)	(²)	(²)
Engineers-----	367	389	411	396	407	418	407	356	11
Professional sanitarians and other sanitation person- nel-----	7, 315	7, 063	7, 151	6, 932	6, 810	6, 638	6, 461	6, 531	784
Veterinarians-----	265	295	300	328	327	328	308	(²)	(²)
Laboratory personnel-----	1, 290	1, 286	1, 302	1, 325	1, 301	1, 315	1, 355	1, 391	-101
Health educators-----	259	273	261	276	272	281	256	221	38
Nutritionists-----	102	111	101	101	106	103	102	92	10
Medical and psychiatric social workers-----	284	249	222	192	177	200	148	111	173
Psychologists-----	59	60	52	41	(²)	(²)	(²)	(²)	(²)
Analysts and statisticians-----	183	198	165	168	213	178	(²)	(²)	(²)
Public health investigators-----	329	347	331	388	437	477	(²)	(²)	(²)
X-ray technicians-----	313	332	327	335	296	308	(²)	(²)	(²)
Physical therapists-----	140	133	118	115	100	73	(²)	(²)	(²)
Administrative manage- ment workers-----	453	398	356	368	(²)	(²)	(²)	(²)	(²)
Clerks-----	8, 645	8, 472	8, 477	8, 288	8, 280	8, 022	7, 520	7, 184	1, 461
Maintenance, custodial, and service-----	1, 837	1, 849	1, 814	1, 784	1, 911	1, 769	1, 847	(²)	(²)
Others-----	1, 430	1, 327	1, 240	1, 254	1, 162	1, 093	2, 791	4, 594	(²)

¹ District of Columbia personnel and State health district personnel included (adjustment made to eliminate duplication in State personnel serving on State health district staffs). Because of a change in reporting procedures, a count of local personnel was not reported for 1950.

² Not reported separately, but included under "Others" except as indicated otherwise.

³ Figure does not represent the true difference since some personnel were included in one group in some years and in another in other years.

Source: As reported to the Public Health Service by local health departments and compiled by State Grants Branch, Division of General Health Services.

A 1-month study in an urban-rural Tennessee county shows that non-hospitalized patients with diseases of the heart and blood vessels receive many nursing services which are specifically related to their diagnoses and significant to their welfare.

Nursing Services Outside the Hospital for Cardiovascular Disease Patients

MARGARET DENHAM, SIDNEY ABRAHAM, and L. M. GRAVES, M.D.

MORE PEOPLE in the United States are affected, directly and indirectly, by cardiovascular diseases than by any other type of illness. Each year more than half of all deaths in this country are caused by diseases of the heart and blood vessels.

Currently, no valid nationwide statistics on the prevalence of these diseases are available. It is logical to assume, however, that persons with cardiovascular disease comprise the largest single group of patients outside the hospital in need of nursing service. Many physicians, health administrators, and nurses have long been concerned with identifying specifically the elements of public health nursing care being provided to such patients.

A project to effect this identification was carried out during October 1956, when services by 71 nurses to 385 patients with cardiovascular disease outside of hospitals in Shelby County, Tenn., were studied. This area was selected when Memphis nursing groups, while planning an educational program, analyzed their own ac-

tivities and discovered that the nursing staff of the Memphis and Shelby County Health Department for several years had consistently reported about 1,000 visits a month to individuals with a diagnosis of cardiac disease. The small staff of the Visiting Nurse Association of Memphis also reported a high proportion of service to cardiovascular disease patients.

Interest in examining the nursing service comprising this sizable volume was evinced by the medical and nursing directors of the city-county health department, and by the director of the visiting nurse association. Subsequently, detailed plans for the survey were formulated in cooperation with the Heart Disease Control Program, Public Health Service.

The month of October, considered to be typical, was chosen for the collection of data, since this was normally a period in which the least interruption of the usual activities in both local agencies was expected. Data were collected by the nurses as part of their usual duties. No changes in their regular recording procedures were made except that a temporary form for use during the study month was substituted for the permanent record.

Through mutual agreement all the visits to patients with cardiovascular disease during the month were studied to determine the nursing services given to them.

Miss Denham is chief nursing consultant and Mr. Abraham is statistician with the Heart Disease Control Program, Division of Special Health Services, Public Health Service. Dr. Graves is director of the Memphis and Shelby County Health Department, Memphis, Tenn.

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Medical Education Group Formed

The Surgeon General's Consultant Group on Medical Education, composed of 21 members, held its first meeting in Washington, D. C., December 8, 1958, with Frank Bane, former executive secretary of the Council of State Governments, as chairman.

The members of the group, national leaders in medicine, education, and public affairs, were invited by Dr. Leroy E. Burney, Surgeon General of the Public Health Service, to seek answers to the question: How can the Nation be supplied with adequate numbers of well-qualified physicians over the next decade?

Dr. Burney pointed out that the present medical school output will not keep pace with the economic and population growth of the United States, and that the present ratio of 132 physicians to every 100,000 persons will be difficult to maintain. He said that twice as many interns are needed. Public health organizations are short about 10,000 physicians, and 6,000 more psychiatrists are required to fill present vacancies. Dr. Burney also said that people are visiting their doctors twice as often as they were 25 or 30 years ago and are using hospitals at a rate three times that of

1940. With half the population in 1970 expected to be under 20 and over 65 years of age, Dr. Burney observed that health needs will change, particularly with regard to chronic diseases.

Dr. Burney has suggested that the Consultant Group on Medical Education might approach the question of supplying the Nation with adequate numbers of physicians in the following manner:

1. Appraise existing data, plans, and proposals related to medical schools and the Nation's need for physicians.
2. Identify matters upon which agreement has been reached and those that require further study.
3. Recommend actions which might be taken to achieve reasonable and acceptable goals within the next 10 to 20 years.
4. Recommend any specific actions which educational institutions, foundations, industry, and local, State, and Federal governments should take in meeting these goals.
5. Recommend the proper role, if any, that the Public Health Service should play and the steps it should take.

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The Public Health Service had an additional long-range objective. Since the components of nursing service given to patients in relation to their cardiovascular disease had not been documented previously, the experience gathered in this study could be used in designing a schedule which other agencies might use in examining their own services to patients with cardiovascular disease.

The completed study shows only an analysis of the services that the nurse recorded during the study month. It shows neither what took place in prior visits nor the length of service already given the patients. No differential was made between new and old patients. Only those patients referred for nursing services were studied. Those who reached medical care originally through the efforts of the nurse were not revealed in the study. The study cannot be used as an index of the status of all patients in the community with cardiovascular disease.

The Patients

The clinic of the City of Memphis Hospitals was the source of medical care for 76.9 percent of the 385 patients. Only 8.8 percent were under private medical care. The remaining patients received medical care from other facilities of the city hospitals. The policies limiting the nursing program of the health department were responsible for the patients being chiefly beneficiaries of the city-supported medical facilities. Private physicians requesting nursing

services were either referred to the visiting nurse association or necessarily refused service other than for teaching purposes.

Approximately 75 percent of the patients lived within the city limits of Memphis, 12.7 percent were suburban residents, and 7.0 percent lived in rural areas, and the remainder resided in suburban-urban and suburban-rural fringe areas. Most of the patients, approximately 80 percent, lived with their immediate family or relatives; only 65, or 16.9 percent of those studied, lived alone.

Sixty-five patients (16.9 percent) were school age. The health department's school health program in the city and county included responsibility for the followup of children with rheumatic fever, rheumatic heart disease, and congenital heart anomalies with both their parents and their teachers. The nurses' records indicated that conferences with the teacher were held to discuss the care of two children in relation to heart disease. However, since the study was made during the second month of the school year, such conferences may have occurred with greater frequency the preceding month. Also school records, which may have indicated other nurse-teacher conferences, were not included in this study.

Of the 385 patients, 70.6 percent were past age 45 years, and 43.6 percent were past 65. Only 8.3 percent were under 5 years of age, and 15.8 percent were between 5 and 15. Approximately one-fourth of the total patients were under 15 years of age (table 1).

Table 1. Race, sex, and age of cardiovascular disease patients

Age (years)	Total		White				Negro			
	Number	Percent	Male		Female		Male		Female	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
All ages-----	385	100.0	30	100.0	39	100.0	168	100.0	147	100.0
Less than 5-----	32	8.3	1	3.3	1	2.6	12	7.1	17	11.6
5-14-----	61	15.8	6	20.0	8	20.5	24	14.3	23	15.7
15-44-----	20	5.2	0	0	0	0	8	4.8	12	8.1
45-64-----	104	27.0	6	20.0	3	7.7	45	26.8	50	34.0
65-74-----	101	26.2	6	20.0	14	35.9	52	30.9	29	19.7
75 and over-----	67	17.4	11	36.7	13	33.3	27	16.1	16	10.9

¹ Includes 1 white patient, sex not indicated.

Table 2. Diagnosis of cardiovascular disease patients

Type of cardiovascular disease	All patients		Patients with congestive failure				Patients without congestive failure			
	Number	Percent	No other complications		Other complications ¹		No other complications		Other complications ¹	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total.....	385	100.0	143	100.0	62	100.0	125	100.0	55	100.0
Arteriosclerotic.....	95	24.7	56	39.2	19	30.6	17	13.6	3	5.5
Arteriosclerotic and hypertensive.....	43	11.2	19	13.3	12	19.4	6	4.8	6	10.9
Arteriosclerotic and other heart disease.....	10	2.6	4	2.8	5	8.1	1	.8	0	0
Hypertensive.....	76	19.7	34	23.8	15	24.2	21	16.8	² 6	10.9
Rheumatic heart disease.....	41	10.6	7	4.9	³ 2	3.2	24	19.2	8	14.5
Congenital heart disease.....	45	11.7	2	1.4	1	1.6	38	30.4	4	7.3
Other heart disease.....	15	3.9	10	7.0	3	4.8	2	1.6	0	0
Undiagnosed heart disease.....	36	9.4	11	7.7	5	8.0	16	12.8	4	7.3
Cardiovascular disease other than heart.....	⁴ 24	6.2	0	0	0	0	0	0	24	43.6

¹ Includes patients with cardiovascular disease other than heart and with medical conditions associated with cardiovascular disease; also includes 16 patients with stroke.

² Also rheumatic heart disease.

³ Also congenital heart disease.

⁴ Includes 10 with acute rheumatic fever.

Table 2 shows that 38.5 percent of the patients were diagnosed as having arteriosclerotic heart disease: 24.7 percent were diagnosed as being only arteriosclerotic, 11.2 percent as arteriosclerotic and hypertensive, and 2.6 percent as having arteriosclerosis and other heart diseases. One-fifth were diagnosed as having only hypertensive heart disease; one-tenth had rheumatic heart disease; and more than one-tenth had congenital heart anomalies. Ten patients were under treatment for acute rheumatic fever. The specific heart disease had not been determined for about one-tenth.

The heart disease in 205, or 53.2 percent, was complicated by congestive heart failure. Less than one-third (117) of all the patients had other complications such as diabetes and cerebrovascular disease.

Who Made Visits

A total of 71 nurses participated in the study. Of this number 55 were professional nurses employed by the health department for general public health service. In addition, 2 professional nurses and 1 licensed practical nurse

were assigned solely to give home service to patients attending the clinic of the City of Memphis Hospitals who required parenteral diuretics. Five clinic nurses of the health department participated in the study. The visiting nurse association's staff of eight professional nurses contributed their records for analysis.

The public health nursing staff of the health department was distributed over the entire city and county. The three specialized field nurses served chiefly in the metropolitan area and the visiting nurse association's service did not extend beyond the city of Memphis.

More than half (55.6 percent) of the patients depended upon the 55 public health nurses as their one source of service. Visits were made as a part of the nurses' routine daily activities. An additional 3.3 percent of the patients visited by these nurses were also served by the 3 specialized nurses on the health department staff. A few patients went to neighborhood clinics conducted by the health department.

A total of 1,125 visits were made to cardiovascular disease patients during October 1956. The 63 health department staff nurses reported

1,009 visits, or 89.7 percent of the total, and the 8 of the visiting nurse association, 116, or 10.3 percent.

During 1956, the health department staff reported 10,779 visits to cardiovascular disease patients, 7 percent of the total visits for all purposes during that year. Of the total visits to patients with cardiovascular disease, 9.4 percent were made during the month of the study.

In 1956 the visiting nurse association made 1,234 visits to patients with cardiovascular disease, with about one-tenth of them in the month of the study. Visits to such patients amounted to 18.5 percent of the total made to all patients by the staff that year.

What the Nurse Did

Since the chief objective of this study was to determine the scope of services given the cardiovascular patient through a nursing visit, each visit was carefully analyzed.

Through pretest procedures and a review of current medical practice 46 specific possible nursing service items were identified and incorporated in the study code. Provisions for services given but not identified in the preliminary stage of the study also were made.

These specific items were grouped under the following seven broad classifications.

Observations significant to the patient's cardiovascular disease diagnosis

1. The patient's practice in following medical orders concerning medication, diet, and rest-activity regimen.

2. The presence or absence of signs and symptoms expected in congestive heart failure or of other cardiovascular diseases or of other illness.

3. The patient's temperature.

4. Any history relating to the occurrence of rheumatic fever or the presence of pregnancy.

5. Any emotional reactions of the patient or other observations which might have significance in his disease.

Health counseling in applying medical advice or prescription

1. Helping the patient maintain normal nutrition and at the same time follow a low-sodium or low-calorie diet.

2. Working with him to achieve the kind and amount of rest and the activity prescribed.

3. Encouraging him in carrying out normal activities of daily living.

4. Listening to the patient tell his fears of sudden death or other concerns related to his disease and giving him support in maintaining emotional health.

5. Explaining penicillin and sulfonamide regimens prescribed as prophylaxis for rheumatic fever susceptibles, or prior to dental extractions and other surgical traumas for the prevention of subacute bacterial endocarditis in those with rheumatic fever or congenital heart anomalies.

6. Emphasizing the need for a separate bed for persons susceptible to rheumatic fever.

7. Stressing the importance of maintaining a high level of immunizations for those with rheumatic heart disease or congenital heart anomalies.

8. Calling attention to ways of preventing upper respiratory infections.

9. Interpreting a physician's orders.

10. Encouraging the patient to continue under medical supervision.

Drugs administered or instruction given about the medication prescribed

The drugs specifically related to the treatment of cardiovascular diseases and to the prevention or treatment of their complications were identified. They were drugs which physicians commonly prescribed for patients who were referred to the public health nurses for home supervision. They included diuretics, digitalis, insulin, prophylactic penicillin, and sulfonamide drugs. Services were administering the drug or teaching the patient how to take it.

Observations of reactions to treatment

1. Watching the rhythm, quality, and rate of pulse.

2. Taking the apical pulse.

3. Measuring the blood pressure.

4. Weighing or arranging for the weighing of the patient.

5. Noting nausea or gastric disturbance, dizziness, disturbed vision, hemorrhage, condition of skin, or any other observable reaction.

Referral for medical care

Facilities to which patients were referred were specifically identified in this category as treatment and diagnostic clinics, hospitals, emergency services, private physicians, dental services, and health department clinics.

General nursing care

1. Giving or demonstrating the bed bath.
2. Giving the patient or reviewing with him and the person who takes care of him the massage and exercise prescribed.
3. Positioning the patient to prevent contractures and thrombosis or for more comfortable breathing.
4. Giving an enema.
5. Caring for a retention catheter.
6. Teaching other specific nursing procedures.
7. Arranging for care such as home supervision of the patient or arranging transportation to medical facilities or to neighborhood clinic for medication.

Referral to other special services

Specifically identified were speech therapy services, recreation visitor, home teachers, the American Heart Association's Heart of the Home classes, and social agencies.

Services Provided

The 385 patients received 7,571 services during 1,125 visits (table 3). This represents an average per patient of 19.7 services of all types

and of 2.9 visits. The average of all types of services per visit was 6.7.

Of the seven classifications, those services grouped as "observations significant to the cardiovascular disease diagnosis" ranked highest with 355, or 92.2 percent, of the patients receiving service. Services of this type averaged 6.5 per patient and 2.3 per visit. But the average number of visits ranked third with 2.8 visits per patient.

The second largest number of patients, 349, or 90.6 percent, were given services under the classification of "health counseling." The average number of visits in this group, however, ranked fourth with 2.5 visits per patient, and the average number of services per visit, 1.9, ranked third. Services per patient averaged 4.6.

A total of 249 patients (64.7 percent) were administered a drug or instructed about self-administered drugs. They received the highest average of services, 8.0 per patient, and averaged 2.2 services per visit. Slightly more than one-half (51.2) of the patients were given a subcutaneous or intramuscular injection of a diuretic by the nurse.

"Observations of reactions to treatment" were reported for approximately the same number of patients, 247, or 64.2 percent. The reactions identified for the study were of specific significance to treatment which might be prescribed for the cardiovascular diseases. Not all possible reactions were included. An average of 1.4 observations per visit were reported.

About one-fourth, 93, of the patients were re-

Table 3. Nursing services provided cardiovascular disease patients

Classification of services	Number			Average number		
	Patients	Services	Visits	Services per patient	Visits per patient	Services per visit
All types-----	385	7, 571	1, 125	19.7	2.9	6.7
Observations significant to the cardiovascular disease diagnosis-----	355	2, 322	994	6.5	2.8	2.3
Health counseling-----	349	1, 619	865	4.6	2.5	1.9
Drugs administered or instructions given-----	249	1, 984	885	8.0	3.6	2.2
Observations of reactions to treatment-----	247	1, 216	845	4.9	3.4	1.4
Referral for medical care-----	93	115	112	1.2	1.2	1.0
General nursing care-----	72	294	165	4.1	2.3	1.8
Referral to other special service-----	16	21	21	1.3	1.3	1.0

ferred for medical care. Of these, 3 patients were referred for emergency medical service, 4 to dental care, and 6 to private physicians. Most of the referrals, 77, were to the city hospitals' outpatient clinic; 3 were to other clinics.

Seventy-two patients (18.7 percent) were given 294 services classed as "general nursing care" during a total of 165 visits. This amounted to an average of 2.3 visits per patient and 1.8 services per visit. Each of the 72 patients received an average of 4.1 general care services.

Sixteen patients (4.1 percent) were referred to community service agencies, but these referrals required 21 visits. One patient was referred to the home teacher service of the board of education.

The fact that a single nursing visit normally was composed of multiple services to one person and that subsequent visits to the same patient might differ in content made interpreting the data difficult. Since scope of service and not quantity alone was to be measured, the specific service item with low frequency might prove to be more significant to cardiovascular disease control than some for which more activity was reported. For example, in this study two patients when visited were found to be pregnant. Since pregnancy represents a stress factor in the woman with heart disease, this observation made early and brought to the attention of the physician could mean prolonged life for the mother. Each item, therefore, maintained its identity in the final tabulations.

All but two services anticipated at the beginning of this study were identified in the patients' records. The observation of the presence or absence of hemorrhage as a reaction to treatment and the administration of penicillin prophylaxis to persons susceptible to rheumatic fever were not reported.

The service most frequently reported was observation of signs and symptoms of congestive heart failure. Slightly more than three-fourths (77.7 percent) of the 1,125 visits recorded during the study included notations regarding these signs and symptoms. In the absence of these symptoms, the nurse may have omitted them from the record.

More than half the patients were under treatment for congestive heart failure. The 10 serv-

ices most frequently given, according to the nurses' records, were related to the treatment of this complication. Diuretics were given intramuscularly or subcutaneously to 197, or 51.1 percent, of the patients. There was indication that teaching about oral and injected diuretics had taken place on visits to 213 patients for whom the medication had been prescribed. The weight of the patient was noted on 106 visits (13.5 percent) at which diuretics were administered in the home.

Oral diuretics were used by 182 patients. On 25 visits nurses noted that patients had experienced gastrointestinal disturbances, a reaction that may have been related to the digitalis or the oral diuretic the patient was taking.

The prescribed digitalis was the 1st three of the services occurring most frequently. These were teaching the patient about medication, which occurred on 451 visits; the practice in taking the drug 10 times; and counting the rhythm was noted on 150 visits of the 775 times the pul.

Other observations noted were skin, cramping of the leg also noted in the patient's ment.

Questions and Further

Certain questions for other patients can be raised as a 385 patients used nursing service 10 month, what had persons in the community cardiovascular disease?

The prevalence any given community since specific cardiovascular disease. tion groups are data in cardiovascular in determining population some degree the population deaths from cardiovascular phis and Shelby side of the hospital. tients in this disease

What needs for nursing service for those with cardiovascular disease were not filled by the two established community agencies? Scientific developments and medical practice are major factors influencing the kinds and amount of nursing required by patients. The change in the philosophy in the rehabilitation of the cardiovascular disease patient has cut the length of hospitalization. Now he is sent home with a prescribed regimen of medication, diet, rest, and activity. He is encouraged toward activity within his therapeutic and functional classification. He is taught to watch for his own level of tolerance and when to report to his physician.

He is responsible for taking his own medication. Oral diuretics are being perfected and used more generally for maintenance of dry weight. The patient or a member of his family must manage the selection and preparation of a special diet. The success of his treatment depends on the patient's and his family's understanding of the prescribed therapy and their ability to obtain the necessities for carrying it out.

Consequently, the need for nursing services shifts from the hospital to the home. In the hospital the dietary and social service departments join the nursing and medical services to meet the needs of patients. What facilities exist to meet these needs after the patient leaves the hospital?

This study represents a sampling of nursing services given in a community as recorded during 1 calendar month. Comparable studies in other communities with different characteristics and plans of public health nursing administra-

tion are needed in order to identify more completely the nursing services outside the hospital received by patients with cardiovascular disease.

Other studies are needed to determine the specific needs of cardiovascular disease patients outside the hospital; to identify current facilities in the community to meet these needs; and to determine the kinds and amounts of additional services required to meet the special needs of cardiovascular disease patients.

Conclusion

This study in Memphis and Shelby County has shown that nurses employed by tax-supported and private agencies perform services specifically related to the particular diagnosis of cardiovascular disease patients. It has shown also that when frequent visits for the purpose of giving medication are not required, the public health nurse in her usual activities performs services significant to the welfare of the patient with cardiovascular disease. It has demonstrated that agency policy controls the kinds and amounts of services the nurses give patients in this disease category.

The study has further demonstrated that the public health nurse recognizes the emotional and social problems which the cardiovascular disease patient faces when he is outside the hospital.

The study can give nursing educators some guidelines for preparing student nurses better to serve cardiovascular disease patients at home. In addition, it can serve as a basis for developing a continuing inservice plan for staff education in cardiovascular disease control.

ferred for medical care. Of these, 3 patients were referred for emergency medical service, 4 to dental care, and 6 to private physicians. Most of the referrals, 77, were to the city hospitals' outpatient clinic; 3 were to other clinics.

Seventy-two patients (18.7 percent) were given 294 services classed as "general nursing care" during a total of 165 visits. This amounted to an average of 2.3 visits per patient and 1.8 services per visit. Each of the 72 patients received an average of 4.1 general care services.

Sixteen patients (4.1 percent) were referred to community service agencies, but these referrals required 21 visits. One patient was referred to the home teacher service of the board of education.

The fact that a single nursing visit normally was composed of multiple services to one person and that subsequent visits to the same patient might differ in content made interpreting the data difficult. Since scope of service and not quantity alone was to be measured, the specific service item with low frequency might prove to be more significant to cardiovascular disease control than some for which more activity was reported. For example, in this study two patients when visited were found to be pregnant. Since pregnancy represents a stress factor in the woman with heart disease, this observation made early and brought to the attention of the physician could mean prolonged life for the mother. Each item, therefore, maintained its identity in the final tabulations.

All but two services anticipated at the beginning of this study were identified in the patients' records. The observation of the presence or absence of hemorrhage as a reaction to treatment and the administration of penicillin prophylaxis to persons susceptible to rheumatic fever were not reported.

The service most frequently reported was observation of signs and symptoms of congestive heart failure. Slightly more than three-fourths (77.7 percent) of the 1,125 visits recorded during the study included notations regarding these signs and symptoms. In the absence of these symptoms, the nurse may have omitted them from the record.

More than half the patients were under treatment for congestive heart failure. The 10 serv-

ices most frequently given, according to the nurses' records, were related to the treatment of this complication. Diuretics were given intramuscularly or subcutaneously to 197, or 51.1 percent, of the patients. There was indication that teaching about oral and injected diuretics had taken place on visits to 213 patients for whom the medication had been prescribed. The weight of the patient was noted on 106 visits (13.5 percent) at which diuretics were administered in the home.

Oral diuretics were used by 182 patients. On 25 visits nurses noted that patients had experienced gastrointestinal disturbances, a reaction that may have been related to the digitalis or the oral diuretic the patient was taking.

The prescribed digitalis was the basis for three of the services occurring most frequently. These were teaching the patient about the medication, which occurred on 451 visits; observing the practice in taking the drug, reported 585 times; and counting the pulse. The pulse rhythm was noted on 150 visits, or 19.3 percent of the 775 times the pulse was counted.

Other observations such as the dryness of the skin, cramping of the legs, and weakness were also noted in the patient's reaction to his treatment.

Questions and Further Studies

Certain questions about the continuity of care for other patients with cardiovascular disease can be raised as a result of this study. If the 385 patients used the types and amounts of nursing service reported in the 1 calendar month, what happened to the larger number of persons in the community who also had cardiovascular disease?

The prevalence of cardiovascular disease in any given community is difficult to ascertain, since specific diagnostic techniques for all cardiovascular diseases applicable to mass population groups are yet to be developed. Mortality data in cardiovascular diseases are not adequate in determining prevalence but do indicate to some degree the extent of the problem among a population group. In 1956 there were 2,492 deaths from cardiovascular diseases in Memphis and Shelby County; nursing services outside of the hospital were given to only 639 patients in this disease category.

Interviews with a sample of the population in Buffalo, N. Y., revealed that 40 to 50 percent of the adult population had received one or more diagnostic X-ray examinations during the preceding 12-month period; 2.5 to 8.0 percent were therapeutically exposed to X-rays during their lifetime.

Diagnostic and Therapeutic X-radiation in an Urban Population

ABRAHAM M. LILIENFELD, M.D., M.P.H.

DURING 1956, a sample of the population of Buffalo, N. Y., was interviewed to determine the frequency and distribution of selected characteristics as a basis for planning epidemiological studies of cancer. Among the characteristics studied was the extent to which persons were exposed to X-rays in diagnostic examinations and to X-rays or radium in therapeutic procedures.

Since recent discussions of population exposures to ionizing radiation have pointed up the need for precise information of this type, data on examinations and therapy are being reported separately. These data may assist in planning more intensive studies in other geographic areas. In addition, this study should be of interest to those concerned with the distribution of such exposure in the population and its relation to the distribution of leukemia.

Method of Study

Data were obtained by interviewing all persons 18 years of age and older in a sample of households and of persons living in lodging houses in Buffalo. Residents of hospitals, convents, dormitories, and other institutions were excluded. Thus, those interviewed represented

the noninstitutionalized population of Buffalo. In both the households and lodging houses, the samples were selected so that they resulted in a uniform sampling fraction of 1 in 75.

For the household sample, addresses were selected systematically from the Buffalo City Directory of 1956, supplemented by a list of new addresses obtained from the building permits issued by the Buffalo Bureau of Buildings. To take care of omissions from the directory, the "half-open interval method" was used; addresses thus obtained were added to the original lists (1). Separate area sampling studies indicated that a small percentage of addresses were missed by these means.

For lodging houses, a list was obtained from the Erie County Health Department, where lodging houses are registered, and a probability

Dr. Lilienfeld is professor of public health administration, and director, division of chronic diseases, Johns Hopkins School of Hygiene and Public Health, Baltimore, Md. This study, which was supported in part by a research grant from the National Cancer Institute, Public Health Service, was carried out while he was chief of the department of statistics and epidemiology, Roswell Park Memorial Institute, Buffalo, N. Y.

Signs

and

Symptoms

of trends in public health

Tranquille Sanatorium, a tuberculosis treatment center in Victoria, B. C., is to become a school for mental defectives because the mortality rate for tuberculosis is the lowest in history.

“ ”

Poliomyelitis in California During the Pre-vaccine Period, 1910-1954, 72 pp., offers an epidemiological analysis of records of the California State Department of Public Health.

“ ”

An Anti-Coronary Club was organized in 1957 by the New York City Health Department to study the relationship between low-fat diets and low-cholesterol levels with low prevalence of heart disease. Coronary occlusions occurring among its 450 members, some of whom have heart disease, will be compared with those in the general population. A cardiologist and nutritionists from the city health department check weight and diet regularly.

“ ”

The human eye needs twice and sometimes three times as much light as it usually gets in today's living and working conditions, reported University of Michigan's Dr. H. Richard Blackwell after studying lighting for 8 years.

“ ”

It is dangerous to smoke while driving, says the Vision Observation Institute of Philadelphia, Pa. Heavy smoking can produce 10 percent saturation of hemoglobin with carbon monoxide instead of oxygen, and 3 percent can “measurably impair” sharpness of vision and depth perception.

The number of unmarried mothers 15-17 years old increased by 40 percent in the 1946-56 decade, states Katherine B. Oettinger, chief of the Children's Bureau. U. S. Commissioner of Education Lawrence G. Derthick agrees with her that the country's school system should offer more assistance to these unmarried mothers.

“ ”

The National Tuberculosis Association's annual report estimates 69,000 new cases of tuberculosis and 14,000 deaths in 1957 in Americans. There are 150,000 known cases of tuberculosis and perhaps 100,000 others.

“ ”

Dr. Mark Keller and Vera Efron report in the *Quarterly Journal of Studies on Alcohol* that 5 in every 100 Americans past 20 years of age were considered alcoholics in 1956. The total number of alcoholics was 6,269,000. Men outnumbered women 6 to 1.

“ ”

The New Jersey State Department of Health has published an 11-page report on 4,077 agricultural migrants. The report covers venereal disease, serologic tests, epidemiological followup, tuberculosis control, and maternal and child health services.

“ ”

In 1936, fat in some form constituted 38 percent of the calories in the average diet; in 1948 it was 42 percent, and today it is 44 percent, according to the Food and Nutrition Board of the National Academy of Sciences.

The Colorado State Department of Health produced a sound and color film in 1958 entitled “Colorado Cares.” The film describes formation of a county migrant council and the steps taken to improve conditions for migrants and their families.

“ ”

George C. Rich, Office of Radiological Defense, Battle Creek, Mich., reports that the Federal Government has distributed 130,000 devices for detecting and measuring fallout to civil defense organizations. Kits for training monitors are being distributed to 6,000 high school students. An additional 81,000 will be distributed next year.

“ ”

Fire Commissioner Edward F. Cavanagh, Jr., blames television for the 90 percent increase in kitchen fires in New York City. Most of the fires occur between 5 and 7 p.m. Sixty-five percent of all fires result from cigarettes. Electrical defects run second.

“ ”

Recommended Methods for the Microbiological Examination of Foods, edited by Dr. Harry F. Goresline, has been published by the American Public Health Association. The book is a guide for public health laboratory personnel in examination of foods and food products.

“ ”

All New Jersey residents 25 years old or older who were not receiving eye treatment were entitled to a free examination during the week of September 22, 1958. Sponsored by the New Jersey Medical Society, the plan enabled residents to obtain examinations at designated hospitals in each county. Cooperating in the program were the New Jersey Academy of Ophthalmology and Otolaryngology, State Commission for the Blind, State Department of Health, and the New Jersey Hospital Association.

“ ”

New York State Activities in the Field of Aging, 1955-1958, 44 pp., summarizes the State's record of progress in the past 4 years.

Table 1. Percentage of persons who had one or more diagnostic X-ray examinations during 12 months preceding interview, and of those who had X-ray or radium treatments during lifetime, by age, sex, and race

Age (years)	Examinations				Treatment			
	White		Nonwhite		White		Nonwhite	
	Men (N=1,766)	Women (N=2,051)	Men (N=170)	Women (N=225)	Men (N=1,793)	Women (N=2,068)	Men (N=172)	Women (N=227)
18-19.....	74.4	66.2	100.0	53.3	16.3	9.2	0	6.7
20-29.....	59.3	53.3	63.3	52.3	4.7	8.8	0	1.5
30-39.....	50.7	38.1	65.1	55.6	8.6	9.9	2.3	1.6
40-49.....	51.2	35.6	57.1	31.0	7.3	9.5	4.8	6.9
50-59.....	34.1	34.3	40.7	31.4	6.0	14.2	3.7	2.9
60-69.....	32.3	25.2	57.1	21.4	5.6	11.2	0	0
70 and over.....	24.0	17.7	50.0	0	3.1	9.5	0	0
All ages.....	45.9	37.2	58.2	44.4	6.5	10.5	2.3	2.6

frequently than women, whereas women were treated more frequently than men. For both men and women in each racial group the frequencies of diagnostic examinations were highest in the younger ages; they decreased with advancing age.

This last finding is surprising, for one would

expect that since the frequency of illness increases with age, diagnostic X-ray examinations would be more frequent in the older age groups. A possible explanation for this age variation would be that young adults are more conscious of health and consequently obtain more X-ray examinations than older adults.

Table 2. Distribution of conditions for which X-ray or radium treatments were given, by sex

Condition for which treatment was given	X-ray ¹				Radium ²			
	Men (N=109)		Women (N=188)		Men (N=10)		Women (N=43)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Acne.....	8	7.3	23	12.2				
Allergy.....			5	2.7				
Arthritis.....			10	5.3				
Backache.....	6	5.5	7	3.7				
Bursitis.....	16	14.7	24	12.8				
Infections, fungus.....	7	6.4						
Infections, skin, sinuses, others.....	17	15.6	19	10.1				
Injuries.....	10	9.2						
Menstrual problems.....			25	13.3	7	70.0	11	25.6
Miscellaneous ³							3	6.9
Muscle aches.....	15	13.8	8	4.3				
Pelvic conditions, general.....							11	25.6
Pelvic conditions, other.....								
Skin conditions, including dermatitis.....	27	24.8	34	18.1				
Thyroid disease.....			8	4.3				
Tumors, including cancer.....	3	2.8	16	8.5	3	30.0	18	41.9
Warts.....			9	4.8				

¹ Percentages calculated from total number in group receiving X-ray treatment.

² Percentages calculated from total number in group receiving radium treatment.

³ Miscellaneous conditions for which radium treatment was received include deafness and spine injuries.

sample was drawn maintaining the same sampling fraction.

When the selection of the sample was completed, the addresses were arranged by socioeconomic status. The socioeconomic status of the population was estimated from information on census tracts in Buffalo published by the Bureau of the Census in 1950. The census tract comprises a neighborhood of between 3,000 and 6,000 persons who are relatively homogeneous with regard to such characteristics as median monthly rental, occupational status, and extent of home ownership. The census tracts in Buffalo were ranked according to the median monthly rental as determined in the 1950 census and then assembled into halves so that approximately 50 percent of the city's population fell into each half. The median monthly rental was considered a valid index of relative socioeconomic status because of its high correlation with other indexes such as family income, years of school completed, and occupation.

For white persons in the sample, each address was assigned to its census tract; the assignment determined whether it fell into the upper or lower socioeconomic group. The non-whites were dealt with separately because of their small numbers; however, a large majority of them were in the lower socioeconomic group.

Use of the 1950 census data for assignment of addresses in 1956 might be questioned, but from our knowledge of areas in the city and the social changes that have taken place since 1950, it seems reasonable to expect that those assigned to the lower group are in general of lower socioeconomic status than those assigned to the upper group. In any event, the 1950 census data are the best available for this purpose.

Addresses from both socioeconomic strata were assigned randomly to interviewers.

A total of 4,456 adults were interviewed. About 11 percent of the adults in the selected sample were not interviewed for various reasons: some refused; some were too ill; and others were not at home despite repeated visits by interviewers. To the extent that these 11 percent differ from the 89 percent interviewed, the information obtained is not representative of the population of Buffalo.

As part of the interview, respondents were

asked if, during the preceding 12 months, they had had X-ray or fluoroscopic examinations of the chest, stomach, bowel, teeth, or other part of the body. Each part was specifically mentioned by the interviewer. If a "yes" answer was received, the interviewer then asked the number of times each part was examined. Each respondent was also asked, "Have you ever had any X-ray or radium treatments?" If the respondent replied, "Yes," he was asked what part of the body was treated, when he received treatment (month, year), and for what reasons treatment was given.

In planning the study, it was thought that information on examinations occurring prior to the previous year would be faulty because of defective recall. On the other hand, it was thought that treatment might be sufficiently vivid in a person's lifetime so that it would be less affected by errors of recall, except for treatment received during childhood. Information obtained by interviews is of course subject to error; this will be discussed more fully later in this report. With respect to the possibility of error, it should also be noted that the information about the individual was obtained directly from the person concerned, not from another family member.

In making comparisons among the various groups in this study, differences in their age composition were taken into account by using the direct method of age adjustment commonly employed in routine vital statistics practice (2). The standard population used for age adjustment was the total sample. The rates presented for these groups are adjusted for age and are directly comparable. The numbers in the groups in the tables vary slightly as a result of the variation in the percentage of "don't know" or omitted answers for individual items.

Age, Sex, and Race Distribution

In table 1, the age-specific percentages of persons who stated they had had diagnostic X-ray examinations and X-ray or radium treatments are presented by race and sex. It is notable that between 40 and 50 percent of the population were exposed to one or more diagnostic X-ray examinations during a 12-month period. In general, among adults men were examined more

Table 4. Frequency distribution of all diagnostic X-ray examinations during 12 months preceding interview, by sex, race, and socioeconomic group

Number of examinations	White men						White women						Nonwhite			
	Upper group		Lower group		Both groups		Upper group		Lower group		Both groups		Men		Women	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0.....	493	50.8	463	58.2	956	51.2	679	59.3	609	67.1	1,288	62.8	71	41.8	125	55.6
1-4.....	422	43.5	308	38.7	730	41.4	416	36.3	270	29.8	686	33.4	89	52.4	94	41.8
5-9.....	40	4.1	16	2.0	56	3.2	36	3.1	21	2.3	57	2.8	9	5.3	5	2.2
10-14.....	8	.8	5	.6	13	.7	11	1.0	4	.4	15	.7	1	.6	1	.4
15-19.....	4	.4	0	0	4	.2	2	.2	2	.2	4	.2	0	0	0	0
20 and over.....	4	.4	3	.4	7	.4	1	.1	1	.1	2	.1	0	0	0	0

for white men in the upper socioeconomic group, whereas the reverse is true for the other examinations. Similar white-nonwhite differences are observed for the women except for examination of the bowel. The higher frequency of chest examinations for the nonwhite group may be explained by the higher incidence of tuberculosis among nonwhites or their increased use of public health facilities, such as county hospitals and health department clinics.

The respondents were also asked to tell the number of diagnostic examinations they had received during the year. For both sexes in the white population, about 4 percent had 5 or more examinations during the year; the upper socioeconomic group had more examinations than the lower (table 4). No information was obtained concerning the number of films taken during these examinations. Consequently, estimates of exposure based on frequencies were rather crude. In future studies of a similar nature, this information should be obtained in more detail in order to estimate more accurately the X-ray exposure experience of a population.

During a lifetime, women of both races received X-ray or radium therapy more frequently than men, and the white population of both sexes received more than the nonwhite (table 5). For both sexes, the white upper socioeconomic group had almost twice the frequency of the white lower group.

Thus, the upper socioeconomic group received both more diagnostic and more therapeutic

X-ray than the lower group, which is consistent with the socioeconomic distribution of leukemia.

Distribution by Religion

Recently, MacMahon and Koller reported the interesting observation that the incidence of leukemia among Jewish residents in Brooklyn, N. Y., was about twice that of the non-Jewish residents (5). They considered the possibility that the Jewish population may have been exposed to more X-radiation since there is evidence that Jews receive more medical care than other religious groups in Brooklyn. Despite the fact that the data from Buffalo and Brooklyn may not be comparable, the X-ray exposure experience in Buffalo was analyzed by religious groups to see if the same variation prevailed.

Since the total number of Jews in our sample was relatively small and since the majority

Table 5. Age-adjusted percentages of persons who received X-ray or radium treatments during lifetime, by race, socioeconomic group, and sex

Race and socioeconomic group	Men		Women	
	Number	Percent treated	Number	Percent treated
Total white.....	1,793	6.5	2,068	10.5
Upper group.....	981	8.5	1,157	12.6
Lower group.....	812	4.2	911	7.7
Total nonwhite.....	172	2.0	227	2.6

This seems likely since, as will be noted later, a vast majority of X-ray examinations are of the chest, and probably many of these were part of mass population surveys.

It is also possible that the increasing use of diagnostic X-rays over the past decades is reflected first in the younger age groups, who may have been more likely to accept such innovations and to continue the practice. Therefore, the percentage of exposed individuals in the older ages may increase in the future. The age distribution may also reflect increases in pre-employment physical examinations and membership in health insurance plans.

More of the nonwhites than of the whites had received diagnostic examinations; this is particularly true for the men, among whom this difference is present for all age groups. For the women, the difference between the races is less marked and is not consistent for all ages. Age-adjusted rates for white and nonwhite women are similar.

About 8 percent of the white population and about 2.5 percent of the nonwhites have received X-ray or radium treatments, or both, during their lifetime (table 1). In general, women were more frequently treated.

The frequencies of conditions for which X-ray and radium treatments were given, at least insofar as the respondent was able to recall, are presented in table 2. It is impossible to evaluate the reliability of such information in the absence of medical records. It is of some

importance that many of the conditions for which treatment was received in the past may not be so treated now.

Socioeconomic Distribution

Age-adjusted frequencies of X-ray examination by part of body examined and by race and sex are shown in table 3. For the white population, frequencies are shown also for the lower and upper socioeconomic groups. In view of the current concern over the association of leukemia with ionizing radiation and the observation that leukemia is more frequent in the upper socioeconomic classes than in the lower, exposure to diagnostic and therapeutic X-ray or radium treatment was analyzed to see if it varied in these socioeconomic groups in a manner consistent with the variation in leukemia (3, 4).

From table 3 we note that a large majority of X-ray examinations were of the chest; this is true for both races and both sexes. For all organs examined, men were more frequently examined than women. Also, the frequency of examination is consistently higher for the upper socioeconomic groups for both sexes and for all organ sites. From our knowledge of the social patterns of medical care this is not unexpected.

Comparisons of the white with the nonwhite groups reveal some interesting differences. The frequency of examination of the chest, stomach, and bowel is higher for nonwhite men than

Table 3. Age-adjusted percentages of persons who received one or more diagnostic X-ray examinations during 12 months preceding interview, by site of examination, sex, race, and socioeconomic group

Site of examination	White men			White women			Nonwhite ¹	
	Upper group (N=978)	Lower group (N=801)	Both groups (N=1,779)	Upper group (N=1,152)	Lower group (N=909)	Both groups (N=2,061)	Men (N=172)	Women (N=226)
Chest.....	39.5	35.8	37.9	29.1	24.3	26.8	49.5	31.4
Stomach.....	6.6	5.4	6.1	5.6	5.4	5.5	8.9	6.0
Bowel.....	4.4	3.6	4.0	3.4	2.2	2.9	5.1	2.2
Teeth.....	11.8	6.5	9.4	12.4	6.3	9.6	4.8	3.7
Other.....	8.9	7.4	8.2	7.2	6.2	6.7	6.5	4.4
All sites.....	49.6	41.7	46.0	41.8	32.9	37.7	57.9	37.6

¹ The small number of nonwhites in this study prevented any meaningful distinction between upper and lower socioeconomic groups.

Sex differences in leukemia mortality are not large, the male-female ratio being about 1.1 to 1.2. The sex differences in frequency of diagnostic and therapeutic X-ray procedures revealed that men had more X-ray examinations than women, and the women had more X-ray therapeutic procedures than men. Perhaps a balancing of these two might result in a total excess exposure of women, particularly since total dose for treatment is probably greater than for diagnostic examinations.

Leukemia is more frequent among whites than among nonwhites; again, the difference is not large. MacMahon and Koller think that this difference is a result of the greater frequency of diagnosis of leukemia among whites than among nonwhites rather than a difference in the true incidence of the disease (5). Frequency of diagnostic and therapeutic X-ray procedures disclosed that nonwhites had more diagnostic but much fewer therapeutic exposures than whites. As with sex differences, perhaps total exposure was greater among whites than among nonwhites.

In contradistinction to the sex and racial differences in the frequency of leukemia, the Jewish and non-Jewish and the socioeconomic group differences are of a larger order of magnitude. Thus, the large differences in X-ray exposure by religion and socioeconomic groups are consistent with large differences in the frequency of leukemia between these segments of the population. While the findings have not been analyzed in a more refined quantitative manner (a procedure not warranted by these data), their consistency points up the need for further study of the relationship of leukemia to the above-mentioned population groups, of radiation exposure to the same groups, and of the association of leukemia with exposure to ionizing radiation.

Summary

During 1956, a probability sample of the adult population of Buffalo, N. Y., was interviewed on the frequency of diagnostic X-ray examinations during a preceding 12-month period, and of X-ray or radium therapy during a lifetime. About 50 percent of the adult population had had one or more diagnostic X-ray

examinations during the 12-month period. Male members of the population had such examinations more frequently than the female members of both races, and for both sexes the nonwhites had received examinations more frequently than the whites. Individuals of both sexes in the upper socioeconomic group received X-ray examinations more often than those in the lower group.

Analysis of the frequency of therapeutic procedures revealed that about 8 percent of the white population had received such exposure during a lifetime compared with 2.5 percent of the nonwhite population. Women of both races had a higher frequency of such treatment than men. For both sexes of the white population, the upper socioeconomic group had such procedures more frequently than the lower group.

The frequency of both X-ray examinations and therapeutic procedures was higher among the Jewish members of the population than among the non-Jewish members. The distribution of X-ray examinations and therapeutic procedures by religion and socioeconomic group was similar to the distribution of leukemia.

Studies are needed in other geographic areas to obtain more detailed information concerning exposure to therapeutic and diagnostic radiation than was possible in the present investigation.

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Table 6. Age-adjusted percentages of persons who had one or more diagnostic X-ray examinations during 12 months preceding interview and of those who had X-ray or radium treatments during lifetime, in upper socioeconomic group, by religion and sex

Religion and sex	Number of respondents	Percent examined	Number of respondents	Percent treated
<i>Jewish</i>				
Men.....	59	54.1	61	13.6
Women.....	65	55.5	65	20.5
<i>Protestant</i>				
Men.....	341	46.8	347	9.4
Women.....	426	43.6	432	12.9
<i>Catholic</i>				
Men.....	536	49.4	537	7.3
Women.....	634	39.7	610	12.5

of them were in the upper socioeconomic group, comparison by religion was limited to the upper socioeconomic group (table 6). For both sexes, Jews had more diagnostic X-ray examinations and more X-ray therapy than the other religious groups. The differences were not large with regard to examinations, but the therapeutic procedures were almost twice as frequent among Jews as among non-Jews. The importance of this observation lies in its consistency with the distribution of leukemia by religion. A possible explanation for the frequency of therapy among Jews may be that the Jewish group was in a relatively higher socioeconomic segment of the upper socioeconomic group. Unfortunately, the number of Jews was too small to permit further study.

Discussion

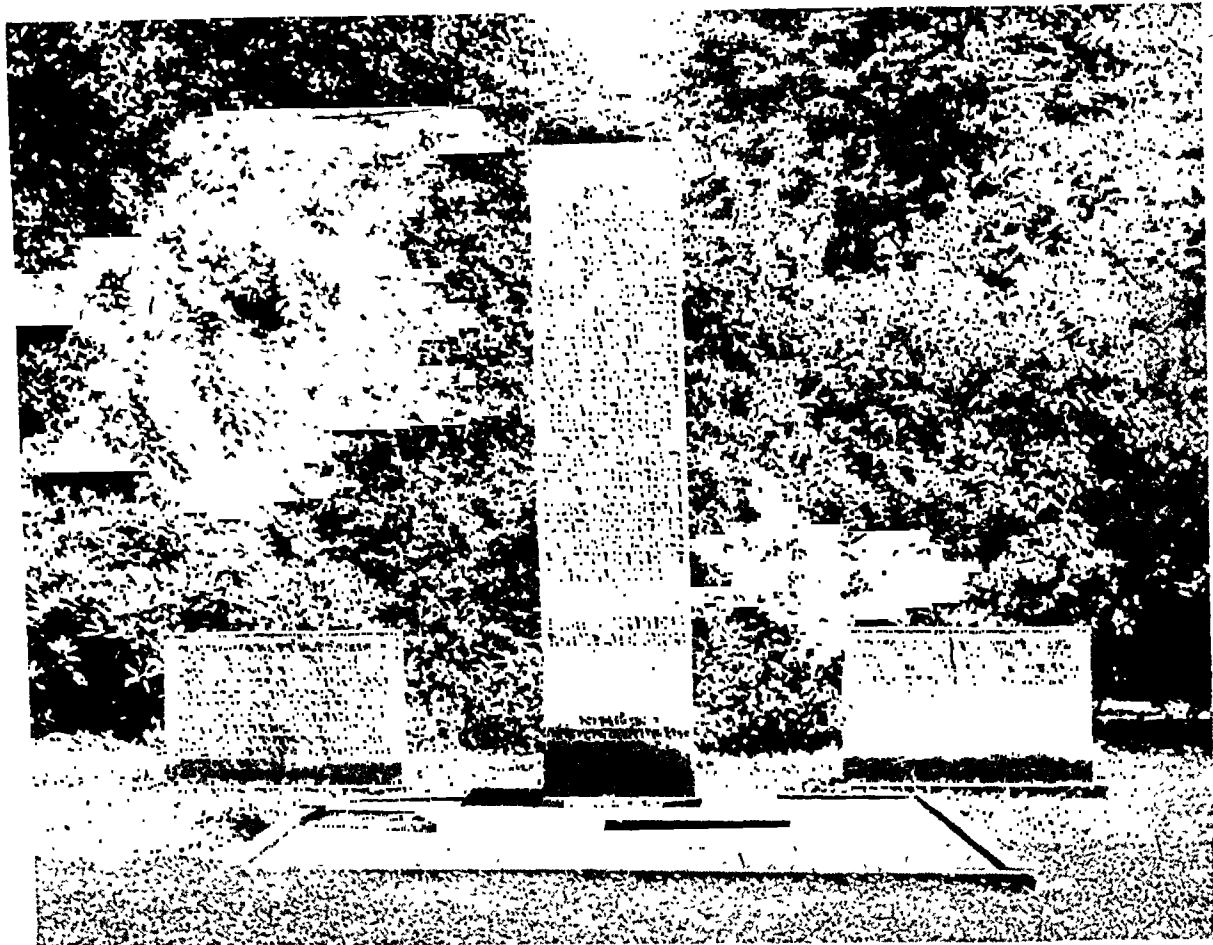
The results of the present study can be considered from two viewpoints. First, they provide some idea of the frequency of exposure of an urban population to diagnostic and therapeutic radiation. Second, they indicate that the frequencies of such exposure are related to several characteristics of the population found previously to be associated with the distribution of leukemia.

In evaluating the estimates of exposure several points must be borne in mind. The estimates may be minimal since, as has been mentioned, some individuals may not have been able to recall all their exposures to X-rays. On the other hand, some may have overestimated, the frequency of diagnostic X-ray examinations: the data were obtained for a period of 12 months preceding the interview and there may have been a tendency for some to state that they had been X-rayed during the past year even though the exposure actually occurred earlier. Such a phenomenon has been observed in morbidity surveys (6). It is therefore difficult to determine the validity of these estimates without medical records. This particular objection does not apply to the frequency of therapeutic procedures. The respondents were asked to provide information on therapy during their lifetime and the only error would lie in underestimation, although it is possible that some individuals may have experienced non-X-ray procedures (such as diathermy) which they erroneously thought were X-ray procedures, or they may have confused diagnostic with therapeutic radiation.

Keeping these difficulties in mind, it still appears that this particular urban population was exposed to a large amount of diagnostic and therapeutic radiation. The frequencies seem so large as to indicate a definite need for repeating similar and more detailed population surveys specifically designed to reveal the extent of exposure. In such studies, it would be essential to establish procedures for determining the validity of the estimated frequencies.

The second point of interest in these results was the distribution of X-ray exposure in different segments of the population. Diagnostic examinations were more frequent among non-whites than whites, men than women, persons in the upper socioeconomic group than those in the lower, and among Jews than non-Jews.

Some of these differences are consistent with the distribution of leukemia in the population. For example, leukemia mortality is higher among persons in the upper socioeconomic group and among Jews. Consistency with regard to sex and racial differences is difficult to evaluate.



Radiation Martyr Memorial, Hamburg, Germany

ciple reaffirmed by Dr. Wendell G. Scott, professor of clinical radiology, Washington University School of Medicine, St. Louis, at a session of the American Medical Association meeting, June 1958, in San Francisco. Scott said, "No matter what the present average gonadal dose in X-ray examinations is, it is too high if it can be lowered."

The policy of the college was outlined in 1956 in the following statement:

"The American College of Radiology will cooperate with all efforts to encourage medical authorities of this country to initiate a vigorous movement to reduce radiation exposure from X-rays to the lowest limit consistent with medical wisdom, and in particular that they take steps to assure that proper safeguards always be taken to minimize the radiation dose to reproductive cells. Radiologists spend long periods in special training and in acquiring ex-

perience to foster judgment in the use of radiations.

"Appropriate training and experience must be insisted upon for all users of radiation. For all, adequate stress must be placed on protection and safety aspects of the use of radiations in human beings. . . . Certain it is that we all desire to keep the dose of radiation to its lowest level to the population that is well. The dose of radiation to those who are ill and require either studies or treatment with radiation should also be kept as low as possible, but here the conditions for judgment are different. In this case, we give as little radiation as possible in order to achieve the desired end of proper diagnosis or treatment; but when, in a careful radiologist's judgment, an individual patient requires a dose exceeding 10 roentgens or any other arbitrary figure, his medical judgment must prevail. One way of keeping diagnostic

Medical Radiation

ALTHOUGH most of its program was given to papers on diagnosis and therapy, the 1958 meeting of the American Roentgen Ray Society in Washington, D. C., opened September 30 with talks on radiation hazards. Dr. Robert R. Newell, U. S. Naval Radiological Defense Laboratory, San Francisco, evaluated clinical exposure, saying, "It is not sensible to stop using diagnostic methods of obvious value for fear of radiation injuries that are unobservable among the ordinary vicissitudes of life. The common-sense solution is to amend the techniques." He recommended that radiologists "tighten up the techniques, starting at the high end, and at the same time undertake more popular education, starting at the low end." He also said it is necessary to get people to stop holding their breath over radiology and to get radiologists "to pant a little bit while they chase around and clip off the needless margins of their diagnostic exposures."

The role of the radiologist as a citizen, with respect to public exposure, was expounded by Dr. George Tievsky, clinical instructor in radiology, George Washington University School of Medicine, Washington, D. C. So that existing knowledge may be applied to the minimization of radiation hazards in clinical practice, he recommended that local radiological groups distribute a questionnaire based on Handbook 60 of the National Committee on Radiation Protection to determine the current pattern of radiation management. He reported that such a survey conducted by the section on radiology in the District of Columbia Medical Society had a good educational effect and also brought out opportunities for improving techniques.

Tievsky urged support of the educational program of the American College of Radiology, described below, to minimize radiation hazards at the hands of others than the trained radiologist. This recommendation raised the question

of consideration by the medical profession of standards of experience and performance for general practitioners and others employing radiation. He also discussed applying Handbook 60 standards to all fluoroscope and X-ray installations and the mastery by radiation users of the fundamentals of biology and dosage given in Handbook 59 (NCRP).

During the meeting, Dr. Barton R. Young, president of the American Roentgen Ray Society, on a national television program, expressed the need to allay hysterical public fears of legitimate X-ray uses in diagnosis and therapy. He emphasized the fact that under proper professional supervision certain parts of the body may be exposed to X-ray repeatedly without exceeding prudent limits. He also emphasized that there is no need to be apprehensive of genetic damage in patients who are unlikely to become parents.

Among the scientific exhibits at the conference was one devoted to elements of radiation protection, sponsored by Drs. Richard E. Petersen, Julius Baron, Bartis M. Kent, and Titus C. Evans, Veterans Administration Hospital, Iowa City. Prominently displayed in this exhibit was a photograph (see page 37) of a memorial to radiation martyrs of all nations at St. George's Hospital, Hamburg, Germany. Unveiled April 4, 1936, the monument has the names of 197 persons, including physicists, technicians, and nurses. More names are to be added. Visitors to the exhibit were given a mimeographed Primer on *Radiation Hazards for Physicians*, produced in collaboration with the radiation research laboratory and department of internal medicine in the Medical College of Iowa.

Coincident with the meeting of the American Roentgen Ray Society, the American College of Radiology reported on its educational activities. These activities are guided by a prin-

Radiation Research

CONFERENCE REPORT

ON THE SAME DAY the United Nations released its report expressing scientific agreement on the probability of harmful consequences to public health from nuclear weapons tests, August 10, 1958, the University of Vermont at Burlington welcomed the International Congress of Radiation Research, sponsored by the Radiation Research Society and the National Academy of Sciences-National Research Council.

Presided over by Alexander Hollaender, Oak Ridge National Laboratory, the conference did not give much attention to ecologic or environmental contamination. The primary interest of most of the scientists present was in basic aspects of radiation action from the physical, chemical, and biological point of view.

Papers presented to the conference bore such titles as "Autoradiograph of the Nucleus in Metabolic State" (Pavan and Ficq) or "Postirradiation Release of Phosphorus by Yeast" (O'Brien). Abstracts of most of the papers presented were published in advance of the meeting. The symposiums are to be published in full.

Through a series of interviews arranged by the university and conference officials, informal statements and conclusions of public interest were elicited from the scientists by reporters representing the wire services, broadcasters, major daily papers, and science news services. As a result, findings by the scientists reached television, radio, and newspaper audiences, as

well as readers of the science press. In appreciation, an unusual tribute to the competence and accuracy of the reporters was paid by the presiding officer at the closing session.

Among items reported to the public were the following:

★ If there is a threshold dose of radiation for shortening life or for the production of leukemia or other forms of cancer, it is probably so low as to be of no great practical significance for public health, said H. J. Curtis, Brookhaven National Laboratory, who doubts there is any threshold at all. A. M. Brues, Argonne National Laboratory, doubted that microdoses reduce life span.

★ Radiation is unique as a life-shortening agent, Curtis and K. L. Gebbhard, also of Brookhaven, concluded after tests which sought and failed to establish life-shortening effects of other nonspecific stresses in mice. They also discovered, after using nitrogen mustard to induce mutations in somatic cells, that the mice recovered from such mutations and lived as long as others. They concluded therefore that somatic mutations induced by radiation are not decisive in the aging process.

★ The average life span of certain mice exposed to low doses of radiation exceeded the average of unirradiated mice, reported L. D. Carlson and B. H. Jackson of the University of Washington, although the longest lived of the unirradiated mice survived the others. Above a given level of radiation, average expectancy

dosage to a minimum is to make every effort to have a given examination done right the first time. It should be emphasized that genetic considerations do not apply to patients who are past the reproductive period or who die without issue after receiving radiation."

The National Committee on Radiation Protection and the International Commission on Radiation Protection have for many years formulated the standards for protection of patients, the public, and personnel engaged in medical diagnostic procedures. So that the entire medical profession be acquainted with such recommendations and with basic information on the physical, radiobiological, genetic, and radiological aspects of the medical use of X-ray, including knowledge of the proper indication for X-ray examinations and the most effective way of performing them, the American College of Radiology has undertaken dissemination of this information to everyone engaged in the healing arts.

Lectures, symposiums, and panel discussions on these subjects have been sponsored by the college at the meetings of local, State, and national medical organizations. These are conducted by experts in radiation physics, radiobiology, genetics, and radiology. The lectures and discussions are published in medical journals, and reprints are distributed to the medical profession by the thousands.

The college has prepared and distributed a Practical Manual on the Medical and Dental Use of X-Rays With Control of Radiation Hazards to 175,000 practicing physicians in the United States. This manual contains basic information brought out by the National Academy of Sciences and the United Nations as well as practical clinical recommendations. It was also sent to all editors of county, State, and national journals. Another 30,000 copies will be distributed to all interns and resident physicians.

Sets of colored slides illustrating the control of the hazards of radiological examinations and explaining the most exact methods of radiographic examinations have been prepared by the college and are available to any physician

who requests them. Several hundred of these slide sets are in use, and new ones are sent out nearly every day for medical groups.

A protection kit has been designed by the college for the same application. It includes reprints of important lectures and papers, with a prepared lecture to help radiologists and other physicians talk on this subject before medical groups. More than 1,000 of these kits have been distributed.

A documentary motion picture film for the medical profession about radiation protection and the proper use of radiological procedures is being financed in part by the college, with support by a grant of \$65,000 from the Rockefeller Foundation.

The objectives of these educational efforts are to:

1. Develop a calm and mature attitude toward the nuclear era, an era that holds great promise for the betterment of mankind.
2. Put an end to unwarranted concern about medical radiation and stop confusion between it and thermonuclear warfare, the latter's massive or chronic whole body irradiation, and occupational exposure to radiation.
3. Have every physician using diagnostic radiology exert positive efforts to keep radiation dosage to the gonads to the lowest level consistent with the best standards of medical practice.
4. Achieve recognition of the fact that radiation to the germinal tissues can be reduced in some instances by 75 to 85 percent without impairing the efficiency of diagnostic examinations and achieve this reduction universally within a short time.
5. Gain realization that the key to implementing the safe use and control of medical radiation lies in the education of all practicing physicians in the fundamentals of genetics, radiobiology, and radiology.

The American College of Radiology is the official spokesman for organized radiology in relations with other organizations, and its principal interest is the socioeconomic aspects of radiological practice. It maintains close liaison with the scientific radiological societies such as the American Roentgen Ray Society.

the faculty of neutralizing free radicals (defined as "molecules looking for electrons") formed in the process of ionization. Although it was emphasized there is no broad public protection visualized in the use of these chemicals, they may have some value for patients undergoing radiation treatment and for workers who must encounter extreme radiation dangers, according to D. G. Doherty and R. Shapira, Oak Ridge National Laboratory.

★ Radiation damage to bone marrow can to

some degree be treated by injections of bone marrow, it was reported by many of the scientists, who held a roundtable on the topic. This announcement opened speculation on the desirability and methods of building banks of fetal bone marrow, the kind most suitable for treating acute injuries. Prevailing judgment in the discussion concluded that bone marrow injections are still quite hazardous and that other therapy should be attempted first, except in the most serious cases.

First Annual NHS Report on Illness

The first annual report on illness, injuries, and physician visits in the United States has been issued by the U. S. National Health Survey, Public Health Service, based on interviews covering 36,000 homes and 115,000 persons during July 1957-June 1958. The continuing survey, authorized by the 84th Congress, is conducted among both institutional and noninstitutional segments of the civilian population, but this report presents major findings only for the noninstitutional segment. More detailed individual reports are scheduled for the future. The following are some highlights of the report.

There were 3,370 million days of restricted activity due to illness or injury, or 20 days per person per year. Days in bed because of illness or injury numbered about 1,310 million, or an average of 7.8 bed-disability days per person a year.

About 438 million cases of acute conditions occurred during the year, with respiratory illnesses ranking first and injuries second as a cause of work-time loss. The 284 million respiratory illnesses included colds, pneumonia, and influenza. In this incidence Asian influenza figured prominently. The incidence of acute conditions was slightly higher among females than males and decreased with age.

Although tabulations for chronic conditions were incomplete, the data showed that circulatory conditions caused 484 million days of restricted activity, 167 million days of bed disability, and 69 million days of work loss.

Physician visits were estimated to be 890 million, about two-thirds in offices, and more in the October-December quarter than during any other period. The survey estimated about 4,000 visits per doctor, based on 220,000 practicing physicians.

declined. The results were affected also by temperature. They concluded there is an interaction between radiation and environment which affects radiation reactions. Others reported that the average life span of lightly irradiated mice was shortened.

★ G. W. Casarett, University of Rochester, observed marked acceleration in the aging of dogs exposed to doses of 3 roentgens weekly. The aging process was not obvious in dogs receiving only a tenth or a fifth as high a dose.

★ The mechanism of radiation injury was described by L. A. Stocken, Oxford, as interference with the assembly line operation in metabolism. The production of high-energy phosphates, he said, is stopped, presumably through injury to critical enzymes in the cellular system. He did not believe that radiation injury results from an accumulation of stresses or insults and did not think it is related to the oxygen supply.

★ To insure human survival against consequences of excessive injury to genetic cells in a nuclear holocaust, H. J. Muller, Indiana University, speculated on the need for banks of human sperm and ova that might be preserved and shielded against radiation.

★ In Russia, radiation sickness is detected by clinical methods, held to be five times as sensitive as the blood tests in use in the United States. Headaches, fatigue, dryness of the mouth, and unusual perspiration are observed, after a daily exposure to 0.02 roentgen over a 6-month period, it was said by M. N. Pobedinsky, Central Radiological Institute, Leningrad.

★ A nuclear power plant, properly designed and operated, can operate safely near a supply of drinking water, but the place for disposition of waste from spent fuel in the reactor may lie only in outer space, in the opinion of R. H. Mole, Medical Research Council, Atomic Energy Research Establishment, England. He proposed a form of international control over disposition of radioactive waste, since the failure of any single government to manage wastes safely can affect the entire world.

★ Mole said that in his judgment the production of obvious defects, such as cancer, results from relatively acute doses, rather than from low-level chronic doses comparable to the

Delegates to the radiation congress witnessed films demonstrating that certain species are capable of sensing the stimuli of intense radioactivity. In the presence of high-level irradiation, snails pulled their heads into their shells, and ants fled from an open pen into a lead-shielded one.

levels of radiation from the natural background. Without implying that low-level chronic irradiation is inconsequential, he asserted that the major concern of public health should be directed at relatively acute doses. He expressed apprehension lest the expanding uses of nuclear power increase the likelihood of acute doses and was critical of unwarranted administration of acute X-ray doses by negligent or incompetent practitioners. In support of his comments, he referred to the recently published Stewart studies of children under 10 years of age with cancer diseases: 10 percent had a history of exposure of the order of 2 roentgens over the whole body in about an hour.

★ The relative importance of acute doses was reported also by W. L. Russell, Oak Ridge National Laboratory, with respect to genetic effects. The effect on spermatids of 600 roentgens given in a few minutes was much greater than the effect of the same dose over a period of 6 weeks.

★ To judge by radiation's effects on mice, Curtis suggested that a searching fluoroscopic examination of an expectant mother probably cuts 2 weeks from the longevity of the infant.

★ Females are more likely to be sterilized by a given dose of radiation than males, said L. B. Russell, Oak Ridge National Laboratory, to judge by effects on experimental mice. (Males, however, are more vulnerable to genetic injury.)

★ Twenty different radioactive nuclides were identified in plankton and sessile algae from a site 1 mile below the Hanford reactor farthest downstream, reported J. J. Davis of the Hanford Laboratories. Only five of the nuclides, however, were picked up by fish.

★ Partial protection against radiation effects on bone marrow, for persons exposed deliberately to acute radiation, may be provided by certain inexpensive chemicals, swallowed half an hour before exposure. The chemicals have

concentrate in a relatively small volume of tissue, the thyroid gland, and milk certainly constitutes the major dietary item for infants and children. The net result would be the deposition of radioactive iodine in the thyroids of children in much higher concentration than in the adult population.

It was necessary to condemn about 250,000 gallons of milk from about 600 herds of cattle, over an area from 200 to 300 square miles. The population of the area was approximately 100,000 people. Because of the short half-life of iodine-131, the emergency situation lasted about 2 or 3 weeks. It should be pointed out that this milk could have been used for manufacturing purposes or the feeding of livestock but, because of public apprehension, it was decided not to salvage the milk.

The accident created an extraordinary degree of disturbance. One outcome was recognition of the need for more public as well as scientific understanding of the risks associated with such an incident and for considerably more competence in health and safety as related to atomic radiations.

Recent evidence indicates that the thyroid glands of infants and young children, contrary

to previous belief, are relatively sensitive to radiation. The dosages to children's thyroids closest to the areas in which the milk was condemned were in the order of 10 rad. The unresolved question, therefore, is whether or not the carcinogenic effect associated with radiation exposure of the tissue is a threshold phenomenon. To date there are good epidemiological data indicating that radiation levels as low as 150 rads are associated with a significant incidence (in the order of 1 percent) of thyroid cancer.

As previously pointed out, the radionuclide receiving almost exclusive attention as an internal radiation hazard had been strontium-90. However, it should be remembered that there are other sources which should be considered in evaluating the total dose. The recent report by the Public Health Service on its radioactivity surveillance of milk in selected milksheds supports this point. Although the reported levels of milk radioactivity are appreciably below the presently accepted permissible levels, over the past year the relation of iodine-131 to its permissible levels has been almost the same as that of strontium-90 to its permissible levels.

Certain Food Additives Listed as Safe by FDA

A list of 188 food chemicals, generally regarded as safe for their intended use, has been proposed by the Food and Drug Administration for exemption from testing required by law. The list appears in the *Federal Register*, December 9, 1958, pp. 9516-9517, along with regulations proposed in compliance with the 1958 Food Additives Amendment to the pure food law.

Including some already sanctioned for use, the group comprises 61 preservatives, 39 buffers and neutralizers, 35 nutrients, 5 non-nutritive sweeteners, 5 coloring agents, 5 stabilizers, 4 emulsifiers, and 34 other additives. Thirty-six are limited as to quantity or foods in which they may be used. Other chemicals may be added if they meet the legal criteria.

The proposed regulations take into account that a chemical might be both a new drug and a food additive, in which case only one petition need be filed.

Milk Contamination in the Windscale Incident

ARTHUR H. WOLFF, D.V.M.

RADIOACTIVITY in foodstuffs, particularly milk, is a new public health consideration associated with the atomic age. To my knowledge, the first situation in which radioactivity was reported in milk in sufficiently high concentration to be of immediate concern was the "Windscale incident," which occurred in England on October 10, 1957.

Windscale is located in the northwest corner of England on the Irish Sea. The British Atomic Energy Authority operated a breeder-type nuclear reactor in Windscale which when overheated resulted in a uranium fire. Because the reactor was air-cooled, the air going out the exhaust stack carried with it vast quantities of fission products. The accident admittedly occurred because of faulty instrumentation and human error; the fire was in progress for 24 hours before adequate diagnosis of the situation was made. It should be pointed out, however, that the Windscale reactor is obsolete by present standards. Newer reactors of this type have built-in control and safety features which greatly reduce the probability of such an event recurring.

There are many different radionuclides contributing to the usual spectrum of gross fission products. The one that has received the most public health attention is strontium-90, but it is not too well appreciated that there are other radionuclides to be considered in evaluating the public health aspects of nuclear fission. Radioactive iodine, in particular iodine-131, is a sig-

nificant component of freshly produced fission products. At Windscale a disproportionate amount of the iodine, because of its volatility, was driven off as a result of the fire, bringing about environmental contamination. Only a small fraction of the many other fission products escaped from the stack.

As soon as the situation was recognized, the immediate concern of the health and safety authorities was the possibility of a fallout from the stack exhaust which could result in hazardous levels of external radiation in the downwind area. An immediate evaluation of the downwind external radiation levels was ordered. In the interim, the local constabulary was alerted to assist in an evacuation of the residents in the affected areas if deemed necessary. It was soon determined that the levels of external radiation were extremely low.

The next consideration was the possibility of milk being contaminated. Cattle had been in the fallout area and possibly had ingested contaminated pasture. This fear was realized. Analysis of milk indicated that high levels of radioactivity, most of which was ultimately identified as iodine-131, was being secreted in the milk of the dairy cattle in the fallout area.

The authorities soon realized that they were confronted with a serious problem of milk contamination for which there were no standards of emergency permissible levels that could be appropriately applied. British authorities, guided by certain biological considerations and the exigencies of the situation, set up an emergency permissible level of 0.1 microcurie of iodine-131 per liter of milk and then set up a wide-scale sampling program to delineate the affected milksheds.

The occurrence of radioactive iodine as a contaminant and milk as the vehicle compounded the seriousness of such an incident. Iodine will

Dr. Wolff is chief of the Training Branch of the Division of Radiological Health, Public Health Service. The paper was given at the Communicable Disease Center Conference for Teachers of Veterinary Public Health and Preventive Medicine and Public Health Workers on June 12, 1958, in Atlanta, Ga.

Tests with serums of 248 leprosy patients showed that, in differentiating syphilitic from biologic false-positive reactors, the RPCF test is as reliable as the TPI test.

Reactivity of the RPCF Test in Leprosy Compared With Other Syphilis Tests

GEORGE R. CANNEFAX, B.S., SISTER HILARY ROSS, B.S., and HULDAH BANCROFT, Ph.D.

LEPROSY stands high on the list of clinical entities known to produce biologic false-positive reactions with the conventional serologic tests for syphilis. Of the many procedures which have been used for the differentiation of the BFP reactor from the syphilitic reactor the *Treponema pallidum* immobilization (TPI) test has been considered to be the most reliable. The data presented in this paper indicate that in persons with leprosy, the Reiter protein complement fixation (RPCF) test is as reliable as the TPI test in differentiating syphilitic and biologic false-positive reactors.

The several serologic tests for syphilis employing lipoidal antigens are known to produce varying degrees of biologic false-positive re-

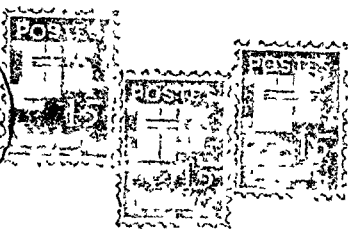
sults with the serum of leprosy patients. In comparative studies in which crude tissue extract and cardiolipin antigens have been used, the percentage of biologic false-positive reactors has been found to be less with tests employing cardiolipin antigens. However, none of the efforts to eliminate these biologic false-positive reactions by refinement of antigen or other modifications has been completely successful.

Studies have been made of the use of Reiter treponemes in complement fixation tests for syphilis to provide information concerning the reliability of these tests when employed with serum from patients with leprosy. Two such studies in which suspensions of whole Reiter organisms were used as antigen in the complement fixation tests for syphilis with leprosy patients have been reported by Eagle and associates (1) and by Kolmer and associates (2). In both of these studies patients at the Public Health Service Hospital, Carville, La., were the source of their testing material. These reports, which may be considered representative of reports from several sources, indicated that the use of antigen consisting of whole Reiter treponemes produced what was considered an undesirable percentage of false-positive results.

The TPI test was applied by Nelson (3) to the serums of 57 Carville patients who were reactive with a complement fixation test employing cardiolipin and with the VDRL slide test. Sixteen of the 57 serums immobilized the trep-

Mr. Cannefax is a bacteriologist with the Public Health Service Venereal Disease Experimental Laboratory at the University of North Carolina School of Public Health, Chapel Hill, N. C. Sister Hilary Ross is the biochemist in charge of the laboratory of the Public Health Service Hospital, Carville, La. Dr. Bancroft is professor of biostatistics, department of tropical medicine and public health, Tulane University, New Orleans, La.

Dr. E. B. Johnwick, medical officer in charge, and Dr. R. R. Wolcott, clinical director, Public Health Service Hospital, Carville, provided clinical information and material for this study. Mrs. Marie B. Nifong and Mrs. Frances T. Moon gave technical assistance in performing the treponemal tests.



The 13th Round

By early 1959 we hope to end the yaws campaign in Esmeraldas Province, Ecuador, and turn over responsibility for residual cases to the ordinary health services. Eradication is virtually complete in the southern part of the province. The only active cases are appearing in the north, along four rivers, where the efforts of the 13th house-to-house round are being concentrated.

—JAMES D. CALDWELL, *chief, Health Division, U. S. Operations Mission, Ecuador.*

Cholera and Smallpox

Before the monsoon began in June 1958, we were fighting cholera and smallpox in East Pakistan. Cholera cases averaged 150 to 200 a week, and smallpox, 1,700 cases and 850 deaths a week.

In April, the Provincial Government asked for help in combating smallpox, and within 2 months a total of 28.4 million doses of smallpox vaccine, sent by 17 countries and the World Health Organization, arrived here. About half the vaccine was distributed and the rest stockpiled.

A United States Navy medical research team based in Taiwan and nine epidemiologists from the Communicable Disease Center in Atlanta, Ga., headed by Dr. Alexander D. Langmuir and Dr. Glenn S. Usher, came in response to the Pakistani Government's request for additional personnel to control the epidemics.

The Navy team began research on cholera and studied the effectiveness of smallpox vaccine after varying periods without refrigeration. The epidemiologists studied the extent of the cholera and smallpox epidemics, the effectiveness of the smallpox vaccinations, and the percentage of those effectively vaccinated.

Reports of this work indicated the practicability of smallpox eradication. We now have ample supplies of vaccine and the people are receptive to the neces-

sary measures. We plan to try various ways to persuade more people to be vaccinated. Each woman will be given the sewing needle used to vaccinate her. Teams of women vaccinators will operate where purdah is observed.

The field tests showed the usefulness of the dried vaccine in East Pakistan. In the past, lack of refrigeration and transportation forced vaccinators to use vaccine lymph of questionable potency, and vaccinating was suspended in the summer months in some parts of the country. The dried vaccine, requiring refrigeration only after it is mixed, will make it possible to vaccinate throughout the year.

We arranged to set up a plant which will prepare dried smallpox vaccine for East Pakistan and to supply a consultant to install the equipment and instruct the Pakistanis who will operate it.

Control of cholera may take years, since it depends upon improvement of water supplies, general sanitation, and health education. Until this is achieved, we can only hope to limit the number of cases.

—JOHN A. BELLIZIA, *acting chief, Health and Sanitation Division, U. S. Operations Mission, East Pakistan.*

Decentralization

I went to Neyriz, a town of 12,000 in Fars Ostan, Iran, to take a trained sanitary aide to his new post and to introduce him to the mayor and the council, who are extremely interested in improving sanitation. While there we selected a site for the slaughterhouse for which 200,000 rials are allocated. They have also submitted a candidate to go to the Palasht School for training sanitarian aides.

The response in Neyriz is typical of other municipalities in Fars Ostan. Their demand for sanitarians exceeds the supply. The idea of local responsibility for public health services seems to be catching on; 6 municipalities have submitted candidates for Palasht.

However, we refuse to place a trained sanitarian aide in a town if we cannot get a satisfactory commitment that the town will assign a qualified municipal employee who will work with the aide and then go to Palasht himself the following year. Thus we get the maximum use out of the training given the people in our placement program.

—DAVID S. REM, *sanitary engineer, U. S. Operations Mission, Iran.*

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The TPI test was applied by Nelson (3) to the serums of 57 Carville patients who were reactive with a complement fixation test employing cardiolipin and with the VDRL slide test. Sixteen of the 57 serums immobilized the trep-

Mr. Cannefax is a bacteriologist with the Public Health Service Venereal Disease Experimental Laboratory at the University of North Carolina School of Public Health, Chapel Hill, N. C. Sister Hilary Ross is the biochemist in charge of the laboratory of the Public Health Service Hospital, Carville, La. Dr. Bancroft is professor of biostatistics, department of tropical medicine and public health, Tulane University, New Orleans, La.

Dr. E. B. Johnwick, medical officer in charge, and Dr. R. R. Wolcott, clinical director, Public Health Service Hospital, Carville, provided clinical information and material for this study. Mrs. Marie B. Nifong and Mrs. Frances T. Moon gave technical assistance in performing the treponemal tests.

Table 1. Number of negative results with five serologic tests of serum specimens from 248 leprosy patients

Number of tests negative	TPI	RPCF	TPCF	VDRL	Kahn	Number of patients	Percent of patients
5-----	-	-	-	-	-	130	52.4
	+	-	-	-	-	1	.4
4-----	-	+	-	-	-	1	.4
	-	-	+	-	-	21	8.5
	-	-	-	+	-	5	2.0
	-	-	-	-	+	24	9.7
3-----	-	-	-	+	+	45	18.2
	-	+	+	-	+	1	.4
	-	-	+	-	-	1	.4
2-----	+	-	+	+	+	7	2.8
	+	-	-	+	+	1	.4
	-	+	+	+	+	4	1.6
1-----	+	+	+	+	+	1	.4
	+	-	+	+	+	1	.4
0-----	+	+	+	+	+	5	2.0

onemes. None of the 57 patients had anamnestic or clinical evidences of syphilis. The frequency of reactors with the TPI test with this group was interpreted by Nelson to be more or less indicative of the syphilis to be expected in the racial and socioeconomic groups from which the patients were drawn.

Edmundson and associates (4) made a clinico-serologic study of 224 Carville patients comparing the results of the TPI test with several conventional serologic tests for syphilis. Reactivity percentages were as follows: TPI, 11.2; VDRL, 46.9; Rein-Bossak, 51.8; Kahn, 52.7; and Kolmer (cardiolipin), 63.4. It was concluded that the TPI results were much more consistent with opinions regarding the prevalence of syphilis in this population than were the results of the other tests.

D'Alessandro and Dardanoni (5) tested 19 patients with leprosy and found 9 reactive with the Kahn test, 8 reactive with a complement

fixation test employing whole Reiter treponemes as antigen, 6 reactive with a cardiolipin complement fixation test, and 4 reactive with the full-volume Kolmer test employing Reiter protein antigen. The status of these patients in relation to past or present syphilis infection was not given.

Previous testing in the Venereal Disease Experimental Laboratory with the RPCF test has demonstrated the Reiter protein antigen of D'Alessandro and Dardanoni to have a high degree of specificity. However, these studies have not included leprosy patients. Therefore, this study was undertaken to determine the relative specificity and usefulness of Reiter protein antigen when employed with the serum of presumably nonsyphilitic leprosy patients. To provide serologic comparison the RPCF, TPI, TPCF, VDRL slide, and Kahn standard tests were performed in parallel on all specimens.

Methods and Material

The RPCF test was that described by Cannefax and Garson (6).

The TPCF (*Treponema pallidum* complement fixation) test was the original procedure of Portnoy and Magnuson (7).

The TPI test was that of Nelson and Diesendruck (8) with added complement according to Thompson and Magnuson (9) and increased sodium thioglycolate as recommended by Portnoy, Harris, and Olansky (10).

Table 2. Reactivity to each test of 248 leprosy patients

Test	Positive reactions	
	Number	Percent
TPI-----	12	4.8
RPCF-----	8	3.2
TPCF-----	38	15.3
VDRL-----	68	27.4
Kahn-----	89	35.9

The VDRL and Kahn tests were those described in *Serologic Tests for Syphilis, 1955 Manual (11)*, and were performed at the Public Health Service Hospital, Carville.

The RPCF, TPI, and TPCF tests were performed at the Venereal Disease Experimental Laboratory, Communicable Disease Center, Public Health Service, University of North Carolina School of Public Health, Chapel Hill.

The patients in this study were unselected in regard to previous serologic testing, age, sex, or form of leprosy. The only criterion for inclusion of patients in this study was that they not have a history or clinical evidence of syphilis.

Results

Table 1 gives the results for each of the five tests with serum specimens from 248 leprosy patients. These data are summarized in tables 2, 3, and 4.

The reactivity of the various tests with serum specimens from the 248 patients is shown in table 2. The RPCF test gave the lowest percentage of positive reactions, 3.2 percent, followed closely by the TPI test with 4.8 percent positive. The TPCF test gave 15.3 percent positive reactions. The highest percentage of positive reactions occurred with the Kahn test, 35.9 percent, with the VDRL slide test showing a somewhat smaller proportion, 27.4 percent.

Table 3 summarizes the data of table 1 to show the reactions of a given test compared with those obtained with each of the other tests.

Table 4 presents the percentage of agreement between each pair of tests, figured as the

Table 4. Percentage agreement among test results for all possible pairs of tests

Test	RPCF	TPCF	VDRL	Kahn
TPI-----	96.0	85.5	75.8	68.1
RPCF-----		87.1	74.2	65.7
TPCF-----			68.5	61.7
VDRL-----				87.5

sum of the number of serum specimens giving positive reactions to both tests and negative reactions to both tests divided by the number of serums tested. The highest agreement between any two tests, 96 percent, was between the TPI and RPCF tests. The disagreement in reaction to these two tests was in 7 serums which were TPI positive and RPCF negative and in 3 which were TPI negative and RPCF positive. Agreement between the TPI and TPCF tests was 85.5 percent. The lack of agreement was accounted for in the major part by finding 31 positive reactions to the TPCF test among serums negative to the TPI test. Comparing the reactions of the RPCF test and the TPCF test, the agreement was 87.1 percent. The percentage agreement between the reagin tests, Kahn and VDRL, and the RPCF, TPCF, and TPI tests was a much lower order. In most instances the disagreement was in the direction of more positive reactions with the reagin tests.

Discussion

This study was initiated to determine the relative specificity and usefulness of the RPCF

Table 3. Comparison between pairs of tests of test results of serum specimens from 248 leprosy patients

Test	RPCF		TPCF		VDRL		Kahn	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
TPI { Positive-----	5	7	7	5	10	2	11	1
Negative-----	3	233	31	205	58	178	78	158
RPCF { Positive-----			7	1	6	2	6	2
Negative-----			31	209	62	178	83	157
TPCF { Positive-----					14	24	16	22
Negative-----					54	156	73	137
VDRL { Positive-----							63	5
Negative-----							26	154

test when employed with the serum of leprosy patients. The data accumulated demonstrate that the RPCF test possesses a high degree of specificity when used as a serologic test for syphilis in a presumably nonsyphilitic population with leprosy. In only three instances was there a positive reaction to the RPCF test with negative reactions among the other tests. One of these serums was weakly reactive with the RPCF test and nonreactive to all other tests: 1 serum was nonreactive to 3 other tests; 1 serum was nonreactive to 1 other test. The RPCF test was reactive in 5 serums in which results of the other 4 tests were also reactive. Hence, only 2 serums reacted to the RPCF test that would not have been found reactive with at least 2 other tests.

There appeared to be no relationship between the type of leprosy, the activity of the disease, and the response to the different tests. Previous studies which have employed standard serologic tests for syphilis have generally shown an appreciable incidence of biologic false-positive results only among lepromatous cases. The patients were divided into the following categories: active lepromatous, 167; arrested lepromatous, 56; active tuberculoid, 11; and inactive tuberculoid, 14. Of the patients reactive to all tests, 4 were lepromatous in type with positive bacteriology, the remaining 1 was a negative tuberculoid. The single patient weakly reactive with the RPCF test who was negative to all other tests was a positive tuberculoid.

Summary and Conclusions

The serums of 248 presumably nonsyphilitic leprosy patients tested with five serologic tests resulted in the following reactivities: RPCF, 3.2 percent; TPI, 4.8 percent; TPCF, 15.3 percent; VDRL, 27.4 percent; and Kahn, 35.9 percent.

Comparison of the reactivities of the five tests indicates that the RPCF and TPI tests most closely approximated the expected serologic activity in relation to clinical and anamnestic information.

It appears reasonable to conclude from the data accumulated during this study that the reliability of the RPCF test with serum from

patients with leprosy is of the same order of magnitude as the TPI test and more reliable than the TPCF, VDRL, and Kahn tests.

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Prevalence, incidence, and carrier rates reveal that intestinal infection is common in Alaska, especially among infants and preschool children. The greatest incidence is in the summertime.

Acute Intestinal Infection in Alaska

JOHN E. GORDON, M.D., and FRANK L. BABBOTT, JR., M.D.

THE ARCTIC is no longer the isolated, almost legendary part of the world that it once was. The military consequences of an atomic age, the press for natural resources, and the demands of international air travel bring increasing numbers of people to arctic and sub-arctic regions, with a consequent need for information on medical problems incident to life in cold climates (1).

Epidemiological investigation in the arctic has a peculiar fascination; so little has been done that almost every observation is a contribution to knowledge. This satisfaction is tempered, however, by the realities of fieldwork in a physical environment demanding beyond most others. Hotels are not to be found in the far north; even a modest lodging house is rare; and the hospitality of what may be no more than a chance acquaintance becomes priceless. Travel is arduous. Long trips by commercial airline and local travel by boat, bush plane, and dog sled to collect information on a few hundred people are not unusual. A diet that in-

cludes whale meat and seal liver, although admittedly these are delicacies, still takes some accommodating.

The intestinal infections are an attractive starting place in arctic epidemiology because the mass behavior of these diseases has been well worked out through long study in temperate and tropical regions. Also, the required bacteriological procedures are relatively simple, a consideration of moment in the arctic where field conditions are as difficult as they are. Alaska was chosen as the first study area. As a cultural and administrative part of the United States, conditions were good for communication and cooperation.

The primary purpose was to determine under arctic conditions the mode of transmission of acute infectious diarrhea of man, and to learn something of prevalence and seasonal incidence. Also, intestinal parasites of dog and man were surveyed in two villages, and the ecology of fish tapeworm was examined in one area.

Recurring outbreaks of enteric disease have been recorded among Eskimo populations of Alaska for at least a century and a half, along with dramatic epidemics of smallpox, measles, and influenza. In 1807, Unalaska was devastated by an epidemic, presumably of bacillary dysentery, and the Klondike gold rush of the late 19th century brought outbreaks of dysentery and typhoid fever (2). *Salmonella typhosa* and other salmonellae were isolated repeatedly after the first public health laboratory was established in 1936. Seventeen cases of typhoid fever occurred in Anchorage and its

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vicinity in 1950 (3). Epidemics of shigellosis have been reported within the last decade in such scattered localities as Anchorage, Unalakleet, the Kuskokwim delta, and Barrow (2). Acute diarrheal disease apparently is neither a new nor a negligible cause of morbidity and mortality in Alaska although it is better defined in the south than in truly arctic territory within the Arctic Circle. Such information as exists has been derived mainly from epidemic events; the endemic behavior of enteric and other diseases is little known.

Field Method and Procedure

A choice of study plans rested between a continuous investigation in a single area over a projected period of 3 years or a series of 1-year cross-section surveys in different but representative kinds of arctic environment. The far north with its tundra, taiga, and glacial topography is as varied as the tropics. The main purpose was to define principles governing the mass behavior of intestinal disease in arctic climates. Consequently the decision was for a series of studies in three characteristic regions, the tundra terrain of Alaska, the taiga of Lapland, and the glacier country of Greenland. Similar methods were used in each, and all were under the same field direction. This report concerns Alaska.

The Alaskan studies and those which followed determined primarily the qualitative nature and prevalence of acute intestinal disorders; less certain information on incidence was derived from histories of past illness. In all three areas interest has been such that the future long-term studies necessary for detailed knowledge may be anticipated from local sources.

One Alaskan study population included the Eskimo village of Wainwright, 100 miles west of Point Barrow on the Arctic Ocean, a truly arctic region. The second included three subarctic communities, predominantly Eskimo, in the Kuskokwim delta 400 miles west of Anchorage in southwest Alaska. The intent was to identify similarities and differences in disease behavior in arctic and subarctic situations.

Alaskan residents of the interior and the north live almost wholly in small settlements or

villages, ranging from perhaps 25 inhabitants to centers of 1,000 or more, with 100 to 300 persons the usual concentration. The settlements are widely separated, oftentimes 100 miles apart. Scattered homesteads in a rural setting do not exist for the reason that there is no agriculture in arctic Alaska nor in a goodly part of the northern subarctic. Inhabitants of the villages migrate seasonally to temporary fishing camps or hunting locations on which depends the food supply for dog and man.

The terrain in all four areas was characteristically tundra, the counterpart of the tropical desert. The initial investigations were made during late summer and autumn of 1954 and winter of 1955. Both arctic and subarctic regions were observed again in late spring and early summer of 1955, the time of year when, according to local tradition, epidemics of intestinal disease are concentrated.

The field team included an epidemiologist, a bacteriologist, and an interpreter locally recruited in each village. By house-to-house visits we obtained a census of the community, data on families and family members, and information on physical and social features of the environment relating to the behavior of enteric disease. We examined patients with acute diarrhea and obtained histories of such illness for each family member during the preceding year, the criteria being three or more loose stools in a single day with variable symptoms and duration. The histories included dates of onset and time sequence within the household. Arrangements were made for stool specimens, and approximately 88 percent of the interviewed persons cooperated.

Histories of minor illness have recognized weaknesses, especially when concerned with events that occurred several months before. A good clinical description is scarcely to be expected, and the longer the interval, the less likely are illnesses to be recalled. Morbidity data on common endemic intestinal infections are almost completely lacking in these arctic regions, and they are sketchy at best for most populations anywhere. By taking an actual census of the study population and by making surveys at different seasons of the year, the frequency of diarrheal disease and the age groups most involved were reasonably estimated.

A conviction that the laboratory is an essential feature of fieldwork required full support in this instance, for it was necessary to transport 800 pounds of apparatus and materials in field chests by air either to Barrow or Bethel, and thence by multiple trips in small, chartered bush plane or river boat to the villages under study. Adequate and comfortable space was usually available in the community schoolhouse, but a laboratory in the arctic should not anticipate the usual niceties of running water, gas, and electric current.

Specimens of feces collected in the field were plated promptly on *Salmonella-Shigella* (Difco) agar, and also inoculated into selenite enrichment broth (4). The remainder was examined for intestinal parasites. After 18 to 24 hours incubation of the enrichment medium, a second SS agar plate was made. Suspicious colonies from both sources were picked into triple sugar iron agar (5). Cultures having growth characteristics compatible with *Shigella* or *Salmonella* were transferred to nutrient agar slants. Confirmation through biochemical tests and serologic typing was done later in Anchorage at the Arctic Health Research Center, Public Health Service. Ill-defined cultures ultimately were identified at the Laboratory Branch, Communicable Disease Center, Atlanta, Ga.

In addition to providing facilities of a base laboratory, the staff of the research center and of the laboratories of the Alaska Department of Health also took part in a number of the field studies. The knowledge they had of the country and of local disease behavior was of material aid. Subsequently, Fournelle and associates continued observations in the subarctic study area, the results of which are published in this issue of *Public Health Reports* (pp. 55-59).

Incidence of Acute Diarrheal Disease

The population of the four Alaskan communities of Wainwright, Bethel, Napaskiak, and Kwethluk, as determined by actual census, was 1,197 persons, of whom 692 were interviewed by household visit. Since whole families were the unit of observation, the study group was representative of age and sex dis-

Table 1. Acute diarrhea in four Alaskan communities,¹ 1954-55, by age

Age (years)	Number of persons	Cases of diarrhea during preceding year ²	Incidence per 1,000 population per year ²	Observed cases of diarrhea ³	Prevalence per 1,000 population
0-4----	143	55	385	5	35
5-14----	203	41	202	1	5
15-44----	259	29	112	5	19
45 and over--	87	20	230	0	0
Total..	692	145	210	11	16

¹ Wainwright, Bethel, Napaskiak, and Kwethluk.

² Determined by household interviews.

³ Determined by single visit.

tributions within the village. The number of cases of diarrhea recalled for the previous 12 months was 145, an incidence of 210 per 1,000 per year (table 1). The rate is conservative. Wainwright and Bethel were sampled in late summer and autumn, Napaskiak and Kwethluk in the spring. More nearly complete information is to be expected for months immediately preceding interview.

In the late summer sample, data were collected shortly after maximum seasonal prevalence; in the spring sample, somewhat in advance of that event. Annual rates derived from the two surveys showed no material differences and both indicated a summer maximum. A July survey expectedly would give higher rates and January lower. Dispensary records in two villages, Napaskiak and Kwethluk, showed that 26 percent and 16 percent of the population, respectively, had received medication for acute intestinal disorders during the preceding year. Infants and children under 4 years of age were most commonly ill. This evidence agrees closely with the information obtained by household visit. The rate of 210 per 1,000 per year presumably expresses with fair reliability the frequency of the more severe diarrheal attacks.

The seasonal distribution of 145 recalled cases of diarrhea as obtained by household interview shows a well-marked preponderance in the summer months (table 2), nearly double the number for any other 60-day period.

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human and dog feces, to give a relatively high community dosage but no clinical cases in man.

Epidemic Studies

Promptly with breakup of winter ice in the Kuskokwim River and the opening of navigation in May 1955, headquarters were set up in the village of Napaskiak to investigate in delta communities the anticipated epidemics of diarrheal disease reportedly associated with the spring thaw. The first clinical illness did not appear until mid-June. In nearby Oscarville, a small settlement with unusually poor living conditions, 5 active cases were identified in a population of 48 over a period of 3 weeks, and 4 other persons gave a history of diarrhea within the preceding 2 weeks. *S. flexneri* 2a was isolated from a sick child and from 2 sibling contacts, and *S. flexneri* 3 from an elderly man and his 5-year-old granddaughter, both clinically ill.

Casefinding investigations included 13 other settlements and salmon fishing camps scattered along 20 miles of river and the coastal village of Wainwright bordering on the Arctic Ocean where breakup occurs much later. In a population of 1,050 people observed for 6 weeks after breakup, 21 clinical cases of diarrhea were seen, and a history of 25 other recent illnesses was elicited. Fournelle and his associates resurveyed the Kuskokwim delta area that same autumn and again in late 1956. His reported results in this issue of *Public Health Reports* give details of his earlier communication to us: that in both years more than a quarter of the persons in the area had had diarrhea in the preceding warm weather months; *S. flexneri* 2a was isolated from carriers and patients, two-thirds of whom were less than 12 years old.

Bacillary dysentery, therefore, is endemic in the Kuskokwim area. The reputed occurrence of epidemics associated with breakup did not materialize. Rather, there was a slow buildup of cases, reaching a maximum morbidity in midsummer. Sporadic infections or family groupings of cases are the rule, although small outbreaks occur and *S. flexneri* is as regularly isolated in such instances as in endemic diarrheal disease. Infants and children are most commonly affected.

Conditions in the arctic community of Wainwright essentially duplicated those observed in the subarctic Kuskokwim in incidence, prevalence, and carrier rates, with shigellae again so much the predominating infectious agent that independent tabulations were not necessary.

Mode of Transmission

Acute intestinal disease in the arctic certainly originates in contaminated food or water. A classic outbreak of staphylococcal food poisoning affecting 12 of 35 persons in a camp of state-side workers was an incidental experience in the course of the studies of Eskimo populations. The walrus epidemic of trichinosis in Greenland (8) in 1948 was outstandingly a foodborne infection. The early history of enteric infection in Alaska contains repeated reference to waterborne typhoid fever, and such outbreaks still continue (2). The sanitary precautions accorded whale and caribou meat are such as to suggest to the outsider a distinct likelihood of intestinal infection. Family outbreaks may occur, but there is no record of a community epidemic from such sources.

The annual summer outbreaks of diarrhea are believed largely due to person-to-person contact. The evidence is fourfold. In the first place, cases in a population tend to occur sporadically as opposed to the multiple primary cases of a common-source epidemic with transmission by vehicle. Second, outbreaks are characteristically of slow evolution and protracted course, unlike the sharp-point epidemic related to contaminated community food or water supply. During our investigation, summer outbreaks occurred but not in proximity to the spring thaw and the breakup of ice in rivers and ocean, by which the accumulated wastes of the winter presumably are washed into surface waters. The first cases came some weeks later, and numbers built up gradually to reach a peak in midsummer. Some infections and particularly the earlier ones may well have originated in contaminated water, but the propagation and subsequent course was that of contact spread.

In the third place, food habits of the Eskimo villagers preclude common vehicle transmission since each family is largely responsible for procuring and preparing its own food and

Again, because of the time that surveys were made, a seasonal variation with most cases in early summer appears established; autumn and spring may be unduly weighted.

Because of deficiencies in memory of past minor medical events, these numbers certainly do not represent all cases of acute diarrhea during the year. Based on prevalence (table 1) and a duration of 5 days, the expected incidence is in excess of 1,150 per 1,000 per year.

Prevalence of Acute Diarrheal Disease

Eleven cases of acute diarrhea were encountered in this general population in the course of single household visits, to give a prevalence of 16 per 1,000 population (table 1). *Shigellae* were isolated from three. The frequency was greatest among children under 4 years of age, which coincides with the high incidence in this group as determined by histories of past illnesses. Next in rank was the age group 15-44 years, where little illness was recalled during the previous year. The small numbers permit no conclusions; they do suggest that diarrhea occurs more frequently in this middle-age range than was remembered or reported in the retrospective study of incidence.

Carrier Rates

Identification of shigellae or salmonellae in stools of healthy persons ranged from 0 in Napaskiak to 5 percent in Bethel (table 3). De-

Table 2. Acute diarrhea in four Alaskan communities,¹ 1954-55; cases and annual rates per 1,000 population by 2-month intervals based on household interview

Months	Cases of diarrhea	Annual rate per 1,000 population
December-January-----	6	52
February-March-----	16	139
April-May-----	17	148
June-July-----	48	416
August-September-----	20	174
October-November-----	27	234
Unknown-----	11	95
Total-----	145	210

¹ Wainwright, Bethel, Napaskiak, and Kwethluk.

Table 3. Carriers of *Shigella* and *Salmonella* in four Alaskan communities, 1954-55; rates per 100 healthy persons examined

Community	Population	Number examined	Number of carriers		Total percent carriers
			<i>Shigella</i>	<i>Salmonella</i>	
Wainwright--	230	188	6	0	3.2
Bethel-----	600	138	3	4	5.1
Napaskiak----	130	115	0	0	0
Kwethluk----	237	129	1	3	3.1
Total----	1,197	570	10	7	3.0

spite failure to identify a carrier in Napaskiak, that community reported the highest annual incidence of acute diarrheal disease, 280 per 1,000, of any of the four communities. Only 2 of 17 carriers were adults, both from Kwethluk and both harboring *S. typhosa* of the phage type responsible for the 1950 epidemic in that village. Two carriers were adolescents; the remaining 13 were 12 years of age or less. Age distributions of persons examined are proportionately those of table 1, from which population they were drawn; the numbers differ because some people failed to supply specimens and others with clinical diarrhea were excluded. The low carrier rates for *Shigella* in Napaskiak and Kwethluk may well have been due to the time of year these communities were sampled, in late March and April and 7 to 8 months after the usual peak of summer diarrhea. A prolonged carrier state for *Shigella* is unusual. On the other hand, the results from Wainwright and Bethel were from the autumn survey, much closer to the epidemic season.

Of organisms isolated from carriers, 5 of the 10 shigellae were *S. flexneri* 2a, 3 were *S. flexneri* group form variant, 1 was *S. flexneri* 3, and 1, *S. sonnei*. Of the 7 salmonellae, 4 were *S. typhosa*, and 1 each, *S. typhimurium*, *S. infantis*, and *S. oranienburg*.

No pathogens were isolated from 54 specimens of dog feces which were examined because of the possible role of dogs as a reservoir of salmonellae. Salmonellae were also absent from 300 specimens of human feces collected in the same two villages. Other studies at Barrow (6, 7) revealed *S. typhimurium* in both

Although approximately one-half of the Eskimos observed in this study gave a history of diarrhea, few pathogenic bacteria or parasites were identified as likely causative agents. While diarrhea continues to be a problem, it does not appear to be as serious today as it was in the past.

Seasonal Study of Enteric Infections in Alaskan Eskimos

H. J. FOURNELLE, Ph.D., VIRGINIA RADER, B.A., and CLARISSA ALLEN, R.N.

SEVERAL QUESTIONS pertaining to the recurrence of diarrhea and of bacterial and parasitic infections remained unanswered after a survey of enteric infections in Alaskan Eskimos (1). To augment the survey, we undertook a year's study in an Eskimo community during which time samplings were taken at different seasons. The year-long study was designed to determine occurrence of diarrhea and specific bacterial and parasitic infections by season, age, and sex, and to answer specific questions such as how many times during the year an individual reported diarrhea and how many times bacterial pathogens and parasites were found in that individual.

The occurrence of diarrhea among Alaskan natives has been reviewed by Babbott and associates (2). Fournelle and co-workers (1) found that *Shigella* was the main causative agent among the Eskimos of southwestern Alaska, where the children under 10 years of

age accounted for about two-thirds of the cases of diarrhea and isolates of bacterial pathogens. Approximately one-third of the persons surveyed reported diarrhea, with prevalence greatest during July and August. Few *Salmonella typhosa* and pathogenic *Escherichia coli* were isolated. Dogs were not considered important as a source of human infection because examination of 278 dogs yielded only one bacterial pathogen. Parasitic infections were not considered extensive.

Mainly because of their accessibility throughout most of the year, the neighboring villages of Napaskiak and Oscarville were selected for this seasonal study of enteric infections. The villages are located on the Kuskokwim River in southwestern Alaska about 5 miles from Bethel and approximately 400 air miles from Anchorage. Napaskiak's population was 129 and Oscarville's 46, with a total of 38 household units.

A house rented from an Eskimo in Napaskiak served as a bacteriological field laboratory and as living quarters for the fieldworker (Fournelle). Procedures and techniques have been described previously (3). Briefly, fecal specimens were cultured on SS agar, with enrichment in selenite broth in most cases. Colonies resembling salmonellae, shigellae, or coliform organisms (in infantile diarrhea) were picked onto TSI agar slants and were saved for further

Dr. Fournelle is chief, and Mrs. Allen, an assistant, Bacteriology Unit, Arctic Health Research Center, Public Health Service, Anchorage, Alaska. Mrs. Rader, Gulfport, Miss., was employed under contract as parasitologist. Dr. R. N. Philip, also with the Center, assisted in the preparation of this paper. A portion of the paper was read at the 8th Alaskan Science Conference in Anchorage, September 10-13, 1957.

drink. Finally, the *Shigella* group of enteric pathogens predominated in carrier surveys and among infectious agents isolated from patients. Shigellosis is notably spread by person-to-person contact, although of course vehicle transmission occurs.

Summary

Field studies in 4 Eskimo villages of Alaska, 1 on the arctic coast and 3 in the subarctic Kuskokwim delta region, demonstrated acute diarrheal disease to be common, especially among infants and preschool children. Incidence was greatest in summer. A variety of pathogenic bacteria were isolated from cases and carriers, with *Shigella flexneri* 2a and 3 in greatest frequency. Transmission of intestinal infection in sporadic cases, in family groupings, and in small outbreaks was mainly by person-to-person contact.

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New Clinical Neuropharmacology Research Center

A comprehensive study of drugs and their use in the treatment of mental illness will be conducted at a clinical neuropharmacology research center recently established at St. Elizabeths Hospital. The Federal mental hospital and the National Institute of Mental Health have joined forces in the project.

St. Elizabeths, with its 7,500 patients, provides an ideal setting for clinical studies. The building selected for the center houses 350 patients and is being equipped with laboratories and other facilities for basic research.

At the center, psychiatrists, psychologists, pharmacologists, biochemists, physiologists, and other specialists will conduct extensive studies to determine what happens, physically and psychologically, when tranquilizing and energizing drugs are used in the treatment of various types of mental disorder.

The project will also include research designed to measure the changes in hospital management and care brought about by the use of drugs and how such environmental changes affect the patient.

Dr. Joel J. Elkes, a National Institute of Mental Health pharmacologist and former chairman of the department of experimental psychiatry at the University of Birmingham in England, is the center's director.

The organism was isolated during the August field trip from a 16-year-old male and from an elderly woman whose age was not ascertained. The third individual was a 4-month-old girl from whom the organism was isolated during the January trip.

Parasitic Infections

Parasitological examinations were also made of the 638 fecal specimens collected during the year. All specimens were examined by the MIF direct (4) and concentration techniques (5). There were 292 (45.8 percent) specimens positive for parasites. Parasitic infection rates for the 6 sampling periods ranged between 368 per 1,000 (October) and 587 per 1,000 (April). The largest number of parasitic types found in a single specimen was three. The numbers of individuals infected with one or more parasites and those infected with *Entamoeba histolytica* and *Diphyllobothrium* sp. are shown in table 3 according to age group. In general, total parasitism was high among all age groups, with the lowest frequency of infection in those under 1 year of age. Prevalence of the three classes of parasites listed was high.

The results of the parasitological examinations are shown in table 4. Two hundred fifty-nine parasites were recovered from 174 individuals sampled. Of these, 78 (44.7 percent) had more than 1 parasite. The largest number

Table 4. Parasites recovered from preserved fecal specimens of 174 persons, July 1956-June 1957

Parasites	Number	Percent
<i>Entamoeba coli</i>	90	51.7
<i>Entamoeba histolytica</i>	15	8.6
<i>Endolimax nana</i>	68	39.1
<i>Iodamoeba buetschlii</i>	5	2.9
<i>Giardia lamblia</i>	11	6.3
<i>Chilomastix mesnili</i>	1	.6
<i>Diphyllobothrium</i> sp.....	60	34.5
<i>Enterobius vermicularis</i>	8	4.6
<i>Ascaris</i> sp.....	1	.6

of parasitic types found in an individual was 5, all being found in 2 girls, aged 3 and 10 years. The parasites were *Entamoeba coli*, *Endolimax nana*, *Iodamoeba buetschlii*, *Diphyllobothrium* sp., *E. histolytica*, or *Giardia lamblia*. The 2 girls submitted 5 and 4 specimens, respectively, in each of which 1 or more parasites were found.

Ten of the 15 individuals positive for *E. histolytica* were found in the July sampling. One of the 15 was positive twice, in July and October.

Forty-four (73.3 percent) of the 60 individuals positive for *Diphyllobothrium* sp. were found in the April sampling. Eight individuals were positive twice (7 of them in consecutive samplings), and 1 each was positive 3, 5, and 6 times. One woman, aged 40, was positive

Table 3. Parasitic infections, by age groups, July 1956-June 1957

Age group (years)	Number of individuals sampled	Individuals infected with—					
		One or more parasites		<i>Entamoeba histolytica</i>		<i>Diphyllobothrium</i> sp.	
		Number	Percent	Number	Percent	Number	Percent
Under 1.....	7	1	14.3	0	0	0	0
1-4.....	31	22	71.0	1	3.2	7	22.6
5-9.....	28	23	82.1	2	7.4	9	32.1
10-19.....	29	20	69.0	4	13.8	5	17.2
20-29.....	22	19	86.4	3	13.6	8	36.4
30-39.....	16	13	81.3	1	6.3	10	62.5
40-49.....	21	17	81.0	2	9.5	10	47.6
50-59.....	7	7	100.0	2	28.6	6	85.7
60-69.....	6	6	100.0	0	0	2	33.3
70-79.....	5	5	100.0	0	0	3	60.0
Unknown.....	2	1	50.0	0	0	0	0
Total.....	174	134	77.0	15	8.6	60	34.5

studies in the Anchorage laboratory. For the parasitological examination, a small portion of the fecal specimen was placed in MIF stain-preservative solution (4), which was later shipped to Mississippi for examination by a contract parasitologist.

Prior to laboratory work, each occupied dwelling in the two villages was visited to find out something about morbidity from diarrhea among members of the households. Since it was necessary to employ an interpreter during the interview, diarrhea was defined simply as consisting of at least 3 or 4 stools a day and usually lasting at least 3 days. Although we sought additional information on symptoms, we were not always successful. Usually the mother was the informant. Specimen cartons were left for everyone with instructions to bring specimens to the field laboratory soon after they were passed.

Findings

Six field trips were made during July 1956 to June 1957 with samplings and examinations during July, August, October, January, April,

Table 1. Occurrence of diarrhea, by month, March 1956-June 1957

Month	Number of cases (163)	Attack rate ¹ (per 1,000)
<i>1956</i>		
March.....	4	27
April.....	0	0
May.....	2	14
June.....	18	123
July.....	33	226
August.....	27	166
September.....	15	111
October.....	6	44
November.....	2	12
December.....	20	120
<i>1957</i>		
January.....	13	78
February.....	4	24
March.....	5	30
April.....	2	12
May.....	5	34
June.....	5	34
Unknown.....	2	-----

¹ Rate of persons interviewed reporting diarrhea during specified months.

NOTE: Italics designate months when interview took place.

Table 2. Occurrence of diarrhea, by age groups, July 1956-June 1957

Age group (years)	Person-years observed	Cases of diarrhea	
		Number (163)	Attack rate (per 1,000)
Under 1.....	6.9	2	290
1-4.....	32.9	73	2,219
5-9.....	30.8	26	844
10-19.....	32.8	8	247
20-29.....	27.5	11	400
30-39.....	17.1	14	819
40-49.....	23.1	13	563
50-59.....	8.5	6	706
60-69.....	4.8	5	1,042
70-79.....	5.4	2	370
Unknown.....	3.1	3	968

and June. The individuals sampled in each of the 6 interviews numbered 146, 163, 135, 167, 167, and 147, and totaled 925. Diarrheal attack rates, by month of occurrence, are shown in table 1. Where history of diarrhea was reported, a single episode was recorded only once, although it may have been reported more than once during successive interviews.

The total cases of diarrhea reported were 163. The annual diarrheal attack rate for the community was 845 per 1,000 persons observed. Eighty-eight (50.6 percent) of the 174 individuals sampled reported diarrhea during the year. Of the persons who reported diarrhea, 38 (43.2 percent) had 1 diarrheal attack; 30 (34.1 percent) had 2 attacks; 15 (17.0 percent) had 3 attacks; and 5 (5.7 percent) had 4 attacks. Frequency of diarrhea appeared to be greater among females (53/94) than among males (35/80), but the difference is not statistically significant ($P=0.10$). Annual diarrheal attack rates, according to age groups, are shown in table 2.

Bacterial Pathogens

Bacteriological examinations were made of 638 fecal specimens collected during the six sampling periods. In most instances, multiple stool specimens were received from the 174 individuals sampled, with an average of 3.7 specimens per individual. Only 1 bacterial pathogen, *Shigella flexneri* 2a, was isolated from 3 individuals who gave no history of diarrhea.

diarrhea. In view of this, it is difficult to consider the parasites of any importance as possible causative agents of diarrhea. Of the 15 individuals positive for *E. histolytica*, 9 reported no diarrhea whatsoever throughout the year; 5 reported no diarrhea at the time the specimen was taken; and only 1 person reported diarrhea when the specimen was taken. We have no idea why the highest infection rate for *E. histolytica* occurred during the July sampling nor why the highest *Diphylllobothrium* sp. rate occurred during the April sampling. According to R. L. Rausch in a personal communication, certain of the fish used as food by these people are infected with several species of *Diphylllobothrium*, none of which has been identified as *D. latum*.

The MIF technique of stool preservation has been found to be well suited to delayed examination. Examination by both the direct and concentration procedures gave a greater recovery of parasites than one procedure alone.

Summary

Eighty-eight (50.6 percent) of the 174 Eskimos observed in the villages of Napaskiak and Oscarville during a 1-year period gave a history of diarrhea at some time during the course of the study. Most cases were reported during July and August. Children under 10 years of age accounted for 62.0 percent of the cases of diarrhea, and gave an annual attack rate of 1,431 per 1,000 persons observed. One

bacterial pathogen, *Shigella flexneri* 2a, was isolated from three individuals.

Parasitic infections were high among all age groups, with an average of 77.0 percent of the people parasitized. *Entamoeba coli*, *Endolimax nana*, and *Diphylllobothrium* sp. were most numerous. Individual infection rates for *Entamoeba histolytica* and *Diphylllobothrium* sp. were 8.6 and 34.5 percent, respectively. There appeared to be no correlation between parasitic infection rates and the occurrence of diarrhea.

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3 times; a man, aged 49, 5 times; and a 7-year-old girl, 6 times.

Discussion

This study has revealed a number of points which are similar to the results of the survey previously reported (1). The diarrheal morbidity rate was highest in the age group under 10 years, which also accounted for the largest number of cases of diarrhea. Since interviewing was more frequent during the summer months, more cases of diarrhea were reported during July and August. Although only 1 bacterial pathogen was isolated, it was 1 of the 2 found most often during the survey. There were fewer parasitic infections in younger age groups. The same three parasites were found most often, *E. coli*, *E. nana*, and *Diphyllobothrium* sp.

The number of reported cases of diarrhea varied considerably during the seasonal interviews; high and low attack rates were found during both summer and winter. While most cases of diarrhea were reported as occurring during the summer, there also appeared to be an upsurge in December and January. Diarrhea was reported an average of 1.9 times by the 88 individuals who gave a history of diarrhea, and of these, 50 (56.8 percent) gave a positive history either 2, 3, or 4 times. Certain parasites recurred in the stools of some individuals. These recurrences were either reinfections or continued carrier status, or a combination of both. It was mentioned earlier that *Diphyllobothrium* sp. was found 3, 5, and 6 times in stool specimens taken from 3 individuals during the 6 sampling periods. As would be expected, the largest numbers of repeated positive stools per individual, either in consecutive or intermittent samples, were for *E. coli* and *E. nana*. *E. coli* was found in 3 individuals on 4 consecutive samplings and in 7 and 19 on 3 and 2 consecutive samplings, respectively. *E. nana* was found in 1 and 10 individuals on 3 and 2 consecutive samplings, respectively. These parasites were also found 2 or 3 times in a number of other persons but on intermittent samplings. In most parasitized individuals, these parasites were found only once, for example, *E. coli* in 41 individuals and

E. nana in 49. Most of the other parasites were found only once in a person during the entire year.

No sharp enteric outbreak was reported during the year, although high attack rates were noted during several of the interviews. Although there was a midwinter increase in the number of reported cases of diarrhea, approximately one-half of all cases (51.7 percent) were reported during the period from June to September. Occurrence of the illness was reported as sporadic within and among the families of the two villages.

During interviewing, the symptoms of reported diarrhea appeared to be mild. This was confirmed by Fournelle who experienced a mild diarrheal attack while in the village during the August field trip. (*S. flexneri* 2a was isolated from several fluid stool specimens.)

During the survey prior to this study an impression was obtained that diarrheal diseases were not as serious at that time as had been reported in past years. We wonder now if the problem is even less serious in the community where this study was made in view of the lower attack rates and fewer isolated bacterial pathogens. In general, the community exhibited a higher degree of sanitation, as reflected by personal and household cleanliness, than was shown in most villages visited during the preceding survey.

Although the bacteriological findings of this study are meager and give few clues to the cause of the reported incidence of diarrhea, the survey revealed that the main source was *Shigella*, including, among several organisms, *S. flexneri* 2a, which was isolated in this study. Shigellosis was also implicated in the present study by the sporadic nature of the attacks and by the involvement principally of the group under 10 years of age.

In some instances our findings for parasites varied considerably from the results of Hitchcock (6). Our results are based on specimens collected during a 1-year period, while Hitchcock's were based on specimens taken in a few days. The low *Enterobius vermicularis* rate we found is no doubt due to the examination of the passed stool specimen.

There appeared to be no correlation between parasitic infection rates and the occurrence of

diarrhea. In view of this, it is difficult to consider the parasites of any importance as possible causative agents of diarrhea. Of the 15 individuals positive for *E. histolytica*, 9 reported no diarrhea whatsoever throughout the year; 5 reported no diarrhea at the time the specimen was taken; and only 1 person reported diarrhea when the specimen was taken. We have no idea why the highest infection rate for *E. histolytica* occurred during the July sampling nor why the highest *Diphylllobothrium* sp. rate occurred during the April sampling. According to R. L. Rausch in a personal communication, certain of the fish used as food by these people are infected with several species of *Diphylllobothrium*, none of which has been identified as *D. latum*.

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Detecting Poliovirus in Vaccine Lots Used in Idaho in 1955

CARL M. EKLUND, M.D., WILLIAM J. HADLOW, D.V.M., EDGAR G. PICKENS, and
ROBERT K. GERLOFF, M.A.

THE TWO LOTS of poliomyelitis vaccine associated with the outbreak of paralytic poliomyelitis among Idaho children in 1955 (1) were studied in monkeys to detect virus and compare the relative sensitivity of monkey and man. The method for isolation of poliovirus from monkeys consisted of direct injection of vaccine into those tissues of cortisone-treated animals which were known to support virus growth (2, 3). Vaccine treated with merthiolate and that treated with merthiolate and versene were tested in order to determine the effect of these agents on residual virus.

The data reported in this paper show that the addition of merthiolate to vaccine increases the incidence of animals yielding poliovirus. The data also indicate that monkeys are approximately 500 times more susceptible than man to infection with this agent.

Methods

The monkeys were anesthetized with intravenous sodium pentobarbital before inoculation. Six milliliters of vaccine were injected into each monkey in approximately the following amounts: 0.5 ml. into each thalamic region, 0.6 ml. in the lumbar region of the spinal cord, 0.25 ml. in the region of each tonsil, 1.0 ml. in the brown fat of each axillary region, 0.25 ml. in the region of the inguinal nodes on each side, and 0.5 ml. in the muscles of each thigh.

A special 1¼-inch, 25-gauge needle was used for intraspinal inoculation. The tip was blocked and a small hole was drilled through the shaft about one-eighth inch from the occluded

end. The needle was inserted approximately three-fourths inch into 1 of the first 3 lumbar interspaces so that the inoculum was directed into the long axis of the cord. If a general contraction of one leg occurred immediately after the beginning of injection, followed by a general seizure of both hind legs and the back muscles, the inoculation was considered successful; if such seizure did not occur, inoculation was attempted in one of the other interspaces. Some degree of paralysis, usually severe, always followed inoculation, but this did not interfere with the detection of subsequent paralysis caused by poliovirus infection.

All monkeys received large amounts of cortisone intramuscularly, usually 125 mg. at the time of inoculation, 50 mg. on the second, third, and fourth days after inoculation, and then 50 mg. every other day through the 14th day if the monkeys tolerated these amounts, which they usually did. Starting on the fourth day, blood for detection of virus was taken every other day through the 14th day.

Dr. Eklund, Mr. Pickens, and Mr. Gerloff are with the Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, Public Health Service, Hamilton, Mont., as was Dr. Hadlow before his resignation. Dr. Eklund serves as medical director in the Insect and Animal Borne Disease Section, Mr. Pickens as biological production technician in the Community Health Section, and Mr. Gerloff as sanitarian in the Pathology and Serology Section, where Dr. Hadlow was a veterinarian. Dr. Hadlow is now with the Agricultural Research Council, Compton, Berkshire, England.

Monkeys with clinical evidence of involvement in all four limbs, either paralysis or weakness, were killed by exsanguination under intravenous sodium pentobarbital anesthesia. Monkeys showing no paralysis were sacrificed similarly between the 18th and 21st days after inoculation. From all monkeys, the tonsils, deep retropharyngeal lymph nodes, axillary brown fat, axillary, inguinal, and abdominal lymph nodes, and portions of the cervical and lumbar cord were removed with sterile instruments for attempted virus isolation. The central nervous system was subjected to thorough histological examination.

In the isolation technique, essentially the same as previously reported from the Rocky Mountain and other laboratories, monkey kidney cells were used in all attempted isolations, and, in most instances, KB carcinoma cells were used in parallel tests (4). The monkey kidney cells were incubated approximately 7 days to produce confluent monolayers of cells before inoculation, and the KB carcinoma cells, about 3 days to produce small islands of confluent cells. All cultures were made in 2-oz. prescription bottles containing 10 ml. of medium.

Ten percent suspensions of organs in tissue-culture medium were employed as inoculums. These varied in toxicity to the tissue-culture

Table 2. Isolations of type 2 poliovirus from various tissues of monkeys inoculated by multiple routes with lot 6039

Species and date of inoculation (1956)	Number of monkeys	Brown fat	Mesenteric nodes	Cord	Total monkeys with virus
<i>Rhesus</i>					
February 16----	5	1	0	0	1
February 16 ¹ ----	5	0	0	0	0
May 10-----	10	0	0	2	2
May 23-----	10	1	0	0	1
August 27-----	10	0	0	0	0
<i>African green</i>					
May 23-----	10	2	1	2	3
<i>Cynomolgus</i>					
August 27-----	7	1	0	1	2

¹ Diluted 5 times.

NOTE: No isolations were made from the blood, tonsils, or peripheral nodes.

cells. The following amounts of inoculums were tolerated: blood serum, 1 ml.; tonsil suspension, 0.2 ml.; spinal cord suspension, 0.2 ml.; and lymph node suspension, 0.4 ml. When suspensions of axillary brown fat were tested, the tissue-culture medium was removed

Table 1. Isolations of type 1 poliovirus from various tissues of monkeys inoculated by multiple routes with lot 6039

Species and date of inoculation (1956)	Number of monkeys	Blood	Brown fat	Peripheral nodes	Tonsils	Cord	Total monkeys with virus
<i>Rhesus</i>							
February 2-----	5	0	0	0	0	1	1
February 16 ¹ ----	5	1	1	0	0	0	1
May 10-----	10	0	1	0	0	1	2
May 23-----	10	2	3	0	0	3	3
August 27-----	10	3	1	0	0	2	4
<i>African green</i>							
May 23-----	10	0	0	0	0	0	0
<i>Cynomolgus</i>							
August 27-----	7	2	1	1	1	1	2

¹ Diluted 5 times.

NOTE: No isolations were made from mesenteric nodes.

Table 3. Isolation of type 3 poliovirus from various tissues of monkeys inoculated by multiple routes with lot 6039

Species and date of inoculation (1956)	Number of monkeys	Cord	Total monkeys with virus
<i>Rhesus</i>			
February 16.....	5	0	0
February 16 ¹	5	0	0
May 10.....	10	0	0
May 26.....	10	0	0
August 27.....	10	1	1
<i>African Green</i>			
May 23.....	10	0	0
<i>Cynomolgus</i>			
August 27.....	7	2	2

¹ Diluted 5 times.

NOTE: No isolations were made from non-nervous tissues.

from cells, replaced with about 3 percent brown-fat suspension, and incubated at 37° C. for 4 to 5 hours. After the cells had thus been exposed to the suspension of brown fat, the suspension was removed and replaced with tissue-culture medium.

Lot 6039 was examined first; it served to determine tissues of value in detecting virus. As shown in table 1, type 1 poliovirus was isolated from tissues of 11 of 40 rhesus monkeys (*Macaca mulatta*). Virus was detected in blood, axillary brown fat, and spinal cord. Since no single tissue yielded virus consistently, all three had to be examined for maximum sensitivity in detecting type 1 virus.

Ten African green monkeys (*Cercopithecus aethiops*) were used on one occasion. Type 1 virus was not isolated although it was detected in 3 of 10 rhesus monkeys inoculated the same day. On one of the occasions when 7 cynomolgus monkeys (*Macaca philippinensis*) were used, type 1 virus was isolated from the blood, brown fat, lymphoid tissue, and spinal cord of 1 and from the blood of another.

Type 2 virus was found in the brown fat of 2 of the 40 rhesus monkeys previously mentioned and in the spinal cord of 2 others (table 2). Type 2 virus was also isolated from the spinal cord, brown fat, and lymphoid tissue of 3 of 10 green monkeys. Of the 7 cynomolgus monkeys, 1 had type 2 poliovirus in brown fat and another in the spinal cord.

Type 3 poliovirus was isolated only from the spinal cord of 1 of the 40 rhesus monkeys and not from any other tissue (table 3). It was not isolated from the green monkeys but was isolated from the spinal cords of 2 of the 7 cynomolgus monkeys.

All cultures were observed for at least 7 days after inoculation for cytopathogenic changes in the cells and passaged once on the original host cell regardless of findings in primary culture.

Antibody response was measured by a metabolic inhibition type of neutralization test similar to one described by Salk and associates (5). Trypsinized monkey kidney cells were prepared by a method closely resembling that of Rappaport (6). The highest point of serum dilution which sufficiently protected monkey kidney cells against 100 to 300 TCID₅₀ of virus to allow the pH to decrease to 7 or below was considered the antibody titer of that

Table 4. Distribution of type 1 poliovirus in monkeys inoculated with vaccine lot 6058 treated with merthiolate or merthiolate plus versene

Vaccine	Blood	Brown fat	Tonsils	Peripheral nodes	Mesenteric nodes	Total, other than nervous tissue	Cord
Merthiolate treated.....	3/11	4/11	2/11	1/11	0/11	10	3/11
Untreated.....	0/10	1/10	0/10	0/10	0/10	1	0/10
Merthiolate plus versene treated.....	1/9	1/9	0/9	3/9	1/9	6	0/9
Untreated.....	1/10	1/10	0/10	0/10	0/10	2	1/10

NOTE: In fractions, the denominator shows the number of monkeys inoculated, the numerator, the number with type 1 poliovirus.

Table 5. Distribution of type 2 and type 3 polio-virus in monkeys inoculated with vaccine lot 6058 treated with merthiolate or merthiolate plus versene

Vaccine	Total isolations from non-nervous tissue		Cord	
	Type 2	Type 3	Type 2	Type 3
Merthiolate treated	0	0	1/11	0/11
Untreated	0	0	1/10	0/10
Merthiolate plus versene treated	0	0	0/9	1/9
Untreated	0	0	0/10	1/10

NOTE: In fractions, the denominator shows the number of monkeys inoculated, and the numerator, the number having the designated poliovirus.

serum. Tests of serums collected early in the study were performed in glass tubes; those collected later were tested in cups of disposable plastic panels sterilized by ultraviolet irradiation (?). Nutrient fluid consisted of Hanks' balanced salt solution containing 0.5 percent lactalbumin hydrolysate and 2 percent horse serum. The mixture of serum, virus, cells, and nutrient fluid in each cup of the panel was overlaid with an equal quantity of mineral oil. Each panel was then covered with a sheet of sterile aluminum foil and incubated at 36° C. for 10 to 12 days as determined by behavior of the controls.

Results

Paralytic poliomyelitis from inoculation of the vaccines was limited virtually to monkeys that had a convulsive seizure at the time of inoculation. Of the 20 monkeys that had no seizure, 1, or 5 percent, had typical clinical and microscopic findings compared with 21, or 40 percent, of the 52 with convulsive seizures.

On 4 occasions, 2 different types of virus were isolated from a single rhesus monkey. Twice type 1 virus was isolated from the spinal cord in the same instances that type 2 was isolated from brown fat. Once type 2 virus was isolated from the spinal cord and type 1 from brown fat. In the final instance type 3 virus was isolated from the spinal cord and type 2 from brown fat of a cynomolgus monkey.

Neuropathological findings in two African green monkeys were typical of acute poliomyelitis although virus was not isolated from the spinal cord. In one monkey, paralysis appeared first in the legs and then extended to the arms. The resulting clinical picture was considered typical of poliomyelitis. In the other monkey, general weakness and coarse tremors were observed, but definite paralysis did not occur. In this instance type 2 virus was isolated from brown fat and mesenteric lymph nodes. The interpretation of these lesions is difficult. It may be, however, that since the distribution and character of lesions were typical of poliomyelitis, a true poliovirus infection of the central nervous system can occur in this species although virus cannot be isolated by tissue culture methods.

Effect of Merthiolate in Vaccine

Merthiolate was added to lot 6058 to determine whether it would inactivate residual poliovirus, and this treated preparation was tested only in rhesus monkeys. One aliquot of vaccine was treated with merthiolate to a final concentration of 1:10,000 and stored at 4° C. for 2 months. Another aliquot of vaccine was similarly treated with merthiolate to a final concentration of 1:10,000, and, in addition, versene was added to a final concentration of 7:10,000 in an attempt to prevent the merthiolate action on the virus. This aliquot was also stored at 4° C. for 2 months.

Table 6. Antibody response of monkeys 21 days after inoculation of vaccine lot 6058 treated with merthiolate or merthiolate plus versene

Vaccine	Type 1 response	Type 2 response	Type 3 response
Merthiolate treated	1 1/6	1/6	1/6
Untreated	1/10	10/10	1/10
Merthiolate plus versene treated	1 1/8	5/8	2/8
Untreated	1/10	10/10	3/10

¹ Monkeys who became paralyzed were generally sacrificed before the appearance of antibodies and are not included in this table.

NOTE: In fractions, the denominator shows the number of monkeys inoculated, the numerator, the number with the designated response

The merthiolate-treated portion of the vaccine was inoculated into 11 monkeys and an untreated portion into 10 control monkeys. The following day 9 monkeys were inoculated with vaccine treated with merthiolate plus versene, and again, 10 controls were inoculated with untreated vaccine.

Type 1 virus was isolated from 4 of the 11 monkeys that had received vaccine treated with merthiolate (table 4); 10 isolations were made from peripheral tissue and 3 from the spinal cord. In contrast, from the 10 control monkeys, type 1 virus was isolated only once, from brown fat. Also, in monkeys that received vaccine treated with merthiolate plus versene, type 1 virus was isolated from 4 of 9 monkeys; 6 isolations were made from non-nervous tissue and none from nervous tissue. In the control group, type 1 virus was isolated from 3 monkeys, twice from peripheral non-nervous tissue and once from spinal cord. With respect to the presence of type 2 and type 3 polioviruses, all groups were essentially the same (table 5).

Among the monkeys inoculated with lot 6058, two types of virus were isolated from the same monkey on three occasions. Type 3 was isolated from the spinal cord of two monkeys, while type 1 was isolated from brown fat of one, and type 2 from the brown fat of the other. Type 2 was isolated from the spinal cord and type 1 from brown fat of one monkey.

The antibody responses of the four groups of monkeys receiving vaccine lot 6058 possibly explain the effect of merthiolate in aiding the detection of type 1 poliovirus. Inoculation of lot 6039 in rhesus monkeys uniformly produced type 2 antibodies usually in a titer of 1:64 or higher; type 1 or 3 antibodies seldom

Table 8. Incidence of paralytic disease following inoculation of lot 6039, among animals with a successful intraspinal inoculation

Species and inoculation date	Number of monkeys	Number with typical clinical and microscopic findings	Virus type isolated from cord
<i>May 23, 1956</i>			
African green ---	6	3	Type 2 from 2.
Rhesus -----	4	3	Type 1 from 3.
<i>August 27, 1956</i>			
Cynomolgus ¹ ---	5	3	{Type 2 from 1.
Rhesus ² -----	5	3	{Type 3 from 2.
			{Type 1 from 2.
			{Type 3 from 1.

¹ Type 1 virus was also isolated from brown fat of 1 of the paralyzed monkeys and from the blood of a monkey with no clinical or microscopic findings.

² Type 1 virus was also isolated from the blood of a monkey with no clinical or microscopic findings.

appeared. With untreated vaccine of lot 6058, a similar antibody response was noted in the two groups of monkeys, but the group receiving merthiolate-treated vaccine had no type 2 antibody response (tables 6 and 7), and the group receiving vaccine treated with merthiolate plus versene had a poor type 2 antibody response. Apparently, merthiolate destroyed the antigenicity of type 2 virus and removed some component which interfered with proliferation of type 1 virus in non-neural tissues.

Estimate of Paralytic Dose

Inoculation of monkeys with poliomyelitis vaccine to determine its safety for man calls

Table 7. Degree of type 2 antibody response in monkeys receiving vaccine lot 6058 treated with merthiolate or merthiolate plus versene

Vaccine	Serum dilutions							
	0	8	16	32	64	128	256	512
Merthiolate treated -----	6		1	1	1	2	4	1
Untreated -----	2	2	1	1	1	2	1	2
Merthiolate plus versene treated -----			1	3	1	2		
Untreated -----			1					

¹ Autopsy 13th day after inoculation.

² Autopsy 6th day after inoculation.

for a measure of comparison of the relative sensitivity of monkey and man to residual live virus in a vaccine. The inoculation of lots 6058 and 6039 into 32,000 children in the age group 6 to 8 years resulted in paralytic poliomyelitis in 17 of them (1). No extensive antibody surveys were made in Idaho prior to 1955, so the exact proportion of children susceptible to type 1 poliomyelitis is not known. However, in connection with the 1954 poliomyelitis vaccine evaluation study, serums were obtained from children living in the more densely settled areas of Idaho and, of these, 50 percent had type 1 antibodies. These data indicate a paralytic attack rate of approximately 1 in 1,000 from 1 ml. of vaccine inoculated intramuscularly.

To attempt to get similar data regarding monkeys, the incidence of paralysis was recorded only on the basis of monkeys receiving a successful intraspinal inoculation. Although a total of 6.0 ml. of vaccine was given to each monkey, only the 0.5 ml. given intraspinally can be considered effective in producing paralysis. With lot 6039 the paralytic rates approach 50 percent for all virus types (table 8). With lot 6058 the rates are approximately one-third that of lot 6039 (table 9), but the results may have been influenced by the fact that lot 6058

was examined 6 to 8 months after studies of lot 6039 had been completed.

With both lots of vaccine, the incidence of paralysis was so much greater in monkeys than in children that a vaccine producing no paralysis in monkeys would be unlikely to have deleterious effect on children. If, along with absence of paralysis, no virus can be detected in blood, brown fat, or lymphoid tissue of monkeys, any chance of harmful effects on children appears remote.

Summary

The poliomyelitis vaccine, in two lots, which caused paralytic poliomyelitis in Idaho children in 1955 was studied in monkeys with the objective of detecting virus and comparing the relative susceptibility of children, as determined by observations in the field, and of monkeys, as determined by laboratory experiences.

A method of intraspinal inoculation which assured that the inoculum was actually placed in the spinal cord and inoculations of vaccine directly into lymphoid tissue and brown fat proved to be a most sensitive test for detecting virus in monkeys. Spinal cord, blood, lymphoid tissue, and brown fat all had to be examined for virus. The addition of merthiolate in a concentration of 1:10,000 to the vaccine aided in the isolation of type 1 poliovirus apparently by removing an interfering effect of type 2 virus.

With the methods of inoculation used, monkeys treated with large amounts of cortisone were at least 500 times more sensitive to the effects of the vaccine than children. Therefore, if virus cannot be detected in monkeys, ill effects in children appear very unlikely.

Table 9. Incidence of paralytic disease following inoculation of lot 6058, among animals with a successful intraspinal inoculation

Vaccine and inoculation date	Number of monkeys (rhesus)	Number with typical clinical and microscopic findings	Virus type isolated from the cord
<i>February 26, 1956</i>			
Merthiolate treated.....	11	4	{Type 1 from 3. Type 2 from 1.
Untreated.....	8	1	Type 2.
<i>February 27, 1957</i>			
Merthiolate plus versene treated.....	5	1	Type 3.
Untreated.....	7	2	{Type 1 from 1. Type 3 from 1.

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Social Security Administration Seeks Eligibles

The Bureau of Old-Age and Survivors Insurance is making an intensive effort to find 400,000 people who may be eligible for payments under the 1958 amendments to the social security law and who must file their claims before benefits can start.

Among the more difficult to find are the estimated 60,000 parents who have survived their children and who were dependent upon them for support. Parents of deceased, insured workers are entitled to benefits even if a surviving spouse or child also gets payments.

Some others sought by the Social Security Administration's bureau are disabled workers 50-65 years of age who failed to qualify for benefits formerly because they did not meet work requirements in effect at that time; dependents of disability insurance beneficiaries; and disabled workers under 50 years of age who may have their earning records frozen to protect their rights to future benefits.

Under the law, a person is considered disabled if he is unable to do "any substantial gainful work," and his condition is expected to continue indefinitely. A person who applies for disability insurance benefits or to have his social security record frozen is requested to obtain a statement on his physical condition from his physician. The physician's clinical findings, along with the applicant's education, experience, and other pertinent factors, are studied by a team of trained people, including a physician, to determine whether the person is disabled and whether he can be rehabilitated. Members of State vocational rehabilitational agencies consider the possibility at that time of providing the disabled person with rehabilitative services.

Social security advisers in district offices will provide detailed information to those interested in filing applications.

Highlights of the

Social Security Amendments of 1958

THE SOCIAL SECURITY Amendments of 1958 (*1a*), signed by the President on August 28, 1958, will affect almost every American family both in benefits and in taxes. They will implement further the basic principles of the public assistance titles of the Social Security Act as expressed by Congress in the amendments enacted in 1956:

1. To help the aged attain self-care.
2. To help the blind and disabled attain self-support or self-care.
3. To help those responsible for dependent children to maintain and strengthen family life.

The amendments provide for increased benefits to old-age, survivors, and disability insurance recipients; higher social security taxes for workers and their employers and for the self-employed; an increase in the maximum earnings base for social security taxes and benefits; changes in eligibility requirements which will extend coverage to many individuals and families particularly in disability payments; increased flexibility of Federal participation in State-operated public assistance programs for the aged, blind and disabled, and for dependent children; increased appropriations authorized for each of the three programs under title V of

the Social Security Act (maternal and child health, crippled children's, and child welfare services); and extension of welfare services to children in urban areas on a par with children in rural areas.

Provision is also made for the establishment of advisory councils on child welfare services and on public assistance, similar to the existing Advisory Council on Social Security Financing.

The major amendments are summarized in the following paragraphs.

Old-Age, Survivors, and Disability Insurance

The amendments of 1958 provide for a revision of the financial basis of the old-age, survivors, and disability insurance program through increased benefits and contributions. In addition to strengthening the financial basis of the system, the amendments extend protection for the disabled through benefit coverage for dependents and through the elimination of certain restrictions, extension of the retroactive period for application for disability benefits, and modification of the work requirements for eligibility.

Higher Benefits

Effective with benefit checks for January 1959 (which will be mailed early in February) 12 million men, women, and children now receiving monthly old-age, survivors, and disability benefits will receive automatic increases of about 7 percent.

This report was prepared by Lucy M. Kramer, research analyst in the Division of Public Health Methods, Public Health Service, largely from materials of the Social Security Administration, and in consultation with members of its staff.

Retired workers aged 65 or over now receiving benefits ranging from \$30 to \$108.50 will receive \$33 to \$116. For a retired worker and spouse the maximum will be increased from \$162.80 to \$174.

Payments to dependents and survivors will be increased by about 7 percent also, with maximum payment to a family increased from \$200 to \$254. When several family members receive payments, each may not get the full 7 percent increase.

Disability insurance benefits to totally disabled workers aged 50-65, payable in amounts comparable to old-age insurance benefits, will also be increased by about 7 percent. Disability insurance benefits have been payable under the social security program since July 1957. About 225,000 persons with extended, total disabilities were receiving these benefits as of August 31, 1958.

The House Report on the Social Security Amendments of 1958 noted that wages had increased 12 percent and prices 8 percent since the last benefit increase was put into effect in 1954, and that old-age, survivors, and disability insurance benefits were a major source of income for most beneficiaries. "Clearly, since their benefits are such an important part of their income, the beneficiaries will be in real need if benefit amounts are not adjusted in the light of rising prices, wages, and levels of living" (2a).

Higher Taxes

Beginning in January 1959, the social security tax will increase from $2\frac{1}{4}$ to $2\frac{1}{2}$ percent for both employers and employees. The tax for self-employed persons will go up from $3\frac{3}{8}$ percent to $3\frac{1}{4}$ percent, beginning with 1959 earnings. Scheduled increases— $\frac{1}{4}$ of 1 percent for employers and workers and $\frac{3}{8}$ of 1 percent for the self-employed—will take place every 3 years instead of every 5 years as in the past, and will reach a maximum of $4\frac{1}{2}$ and $6\frac{3}{4}$ percent, respectively, in 1969 instead of 1975 (1b, 2b).

Effective January 1, 1959, the maximum annual earnings base for purposes of taxes and credit towards social security benefits will be increased from \$4,200 to \$4,800. As a result of the change, the maximum retirement benefit

will eventually be \$127 per month for a single worker and \$190.50 for a married worker and spouse 65 years of age or older.

The House Ways and Means Committee believed the rise in earnings levels made such an increase in tax base appropriate. "If the earnings base is not increased as wages rise, the wage-related character of the system will be weakened and eventually lost. In 1950 about 64 percent of regularly employed men would have had all their wages credited toward benefits under the \$3,600 base that was adopted in that year. The \$4,200 earnings base adopted in 1954 would have covered all the wages of about 56 percent of such workers. In 1957 only 43 percent had all their wages credited; about 56 percent would have received full credit under a \$4,800 base. An increase to \$4,800 would restore the situation which prevailed in 1954 and thus, in our opinion, would be a conservative adjustment to the rise in wages that has taken place" (2a).

Improvements in Disability Protection

For the first time, dependents of disabled workers who are receiving disability insurance benefits will receive social security payments. These payments are similar to those now provided for dependents of retired workers. Those eligible are wives and dependent husbands who have reached retirement age, unmarried dependent children (including sons or daughters disabled since childhood), and wives who have an entitled child in their care. As of September 1958 there were about 180,000 dependents of disability insurance beneficiaries who could become eligible for these monthly benefits.

The Social Security Amendments of 1958 eliminated the "disability benefits offset provision," of the law. Before the elimination of this provision, monthly social security disability payments (including childhood disability benefits) were reduced by the amount of any periodic benefit payable on account of disability under any other Federal program (except veteran's compensation) or a State workmen's compensation system. As of July 1958, about 40,000 childhood disability benefits (and about 1,000 childhood disability benefits) were either reduced or withheld as a result of this offset. Beginning in August 1958, the disabled can

receive the full amount of their social security benefits irrespective of any other payments based on disability. The House Ways and Means Committee stated (2c) that, since disability payments under the social security system are intended to provide basic protection against income loss from disabling illness, "it is undesirable, and incompatible with the purposes of the program, to reduce these benefits on account of disability benefits that are payable under other programs."

Another important amendment affecting the disabled changed the work requirements for both cash disability benefits and the disability freeze. The disability freeze preserves the disabled worker's future social security rights to benefits under the old-age and survivors insurance program. His wage record is frozen as of the date of disability. He is assured protection in the amount of benefits he receives at a later date.

Before the changes, to be eligible for either disability benefits or the disability freeze, the disabled worker must have worked in employment covered by social security for at least 5 years during the 10 years preceding disability, of which 1½ years must have been within the immediately preceding 3-year period. To be eligible for disability benefits, the worker must also have been fully insured, that is, he must have made social security contributions for half the 40 quarters in a 10-year working period prior to disability. The requirement of 1½ years out of 3 years, as applied to both the disability insurance benefits and the freeze, was eliminated, and fully insured status was added as a requirement for eligibility for the freeze. Thus, as a result of the amendments, to qualify for disability benefits or the freeze, the worker must be fully insured and must have about 5 years of covered work during the 10-year period that ends with the onset of his disability. As a result of the changed work requirements, about 35,000 persons who could not qualify for disability insurance benefits under the previous requirements can, upon filing application, become immediately eligible for benefits. In addition, about 15,000 persons can qualify immediately for a disability freeze.

The deadline for filing fully retroactive applications for the disability freeze—that is, ap-

plications which permit a disability freeze to be established as early as the actual onset of disability—was extended for 3 years, from June 30, 1958, to June 30, 1961. Under prior law, a disability freeze based on an application filed after June 30, 1958, could begin no earlier than 1 year before application. The postponement of the deadline for filing fully retroactive freeze applications made it possible (if applications are filed) for about 30,000 additional disabled workers to become immediately eligible for disability insurance benefits and an additional 10,000 to become immediately eligible for the freeze.

The amendments also provide for retroactive payment of disability insurance benefits for as many as 12 months before the month in which application is filed for these benefits. Applications for disability insurance benefits are thus accorded the same retroactive status as applications for all other types of monthly benefits under the program.

Public Assistance

The Federal matching formula for public assistance has been changed in three major respects, which, in addition to affecting payments for income and maintenance, have an impact on medical services for public assistance beneficiaries and are of particular significance to public health.

Average Maximum

Effective October 1, 1958, the matchable maximum for Federal contribution to the States, for their aged, blind, and disabled programs, has been set at \$65 per month per recipient, with the matchable maximum determined by averaging the combined money and vendor payments in each State for the total number of recipients. For aid to dependent children, the maximum has been set at \$30, with the matchable maximum also determined by an average based on the total number of recipients. The provision for a lower maximum of Federal participation (\$23) for additional dependent children after the first in the same family has been eliminated, so that the average maximum is applicable to all children and to the needy adult caring for them.

The effect of this amendment will be to increase the Federal share of assistance payments. With only 1 or 2 exceptions, States had not been receiving the maximum money payments available under the prior limit of \$60 for Federal participation. Under the new provisions, the maximum total amount in which the Federal Government participates will be increased, and, for States with low per capita income, the percent of Federal participation will also be increased. In the event that families or persons are responsible for more than one dependent child, States will be provided with additional Federal funds that may be used to increase assistance payments. In addition, administrative and fiscal procedures will be simplified under this amendment.

For payments to the aged, blind and disabled, the Federal share will still be $\frac{1}{3}$ of the first \$30 per recipient, but for the remainder, up to a new average maximum of \$65, the Federal participation will vary with State and national per capita income. For aid to dependent children programs, the Federal share remains $\frac{1}{17}$ of the first \$17 per recipient, but for the remainder, up to a new average maximum of \$30, it will also vary with per capita income.

Variable Grants

Effective October 1, 1958, the previous 50-50 matching of Federal funds above the first part of the average amount per recipient, but within the overall limits, has been changed to a variable range of 50 to 65 percent, based on the average per capita income of a State during the 3 most recent calendar years. This would limit Federal participation to 50 percent for those States whose per capita income is equal to or above the national average for the same period, and allow an upward range to 65 percent for those States whose per capita income is below the national average.

The present law requires the Secretary of the Department of Health, Education, and Welfare to promulgate in alternate even numbered years the Federal percentage of participation for each State.

The Federal percentage of financial participation in State public assistance expenditures, following the initial promulgation (3), is

shown in table 1 for the period October 1, 1958, to June 30, 1961.

For the new Federal matching procedure, a research note prepared by the Division of Program Research of the Social Security Administration summarizes estimates of total and per capita personal income for 1957 alone and for 1955-57 (4). It tabulates by States the ratio of State to national per capita income in order of magnitude for 1957, and compares the results with the 3-year average.

Per capita personal income in 1957 averaged \$2,027 for the continental United States, 3 percent above the average for 1956 of \$1,961. By State, the 1957 average per capita income varied from \$958 in Mississippi to \$2,821 in Connecticut. The range of \$1,863 between the lowest and highest income State went from more than 50 percent below the national average to 39 percent above. When the Federal formula grant is applied in terms of 3-year averages, the order of rank changes with lessening of annual fluctuation. Mississippi remains lowest of the bottom 12 States with an average of \$968. Connecticut no longer ranks first but is second in the top 12, with an average of \$2,678. Delaware is first with \$2,744. Twenty States retain their rank; the rest shift.

The House Ways and Means Committee expressed the belief (2d) that the revised formula "will be of particular assistance to States with limited fiscal resources and will enable these States to make more nearly adequate assistance payments. This will help to more nearly balance the level of assistance made available to needy people in various parts of the country."

Combined Money and Vendor Payments

Effective October 1, 1958, the Federal maximum share of public assistance includes and permits payments by the State to public assistance recipients for all types of aid including medical care. It eliminates the separate matching of payments to vendors, such as doctors, dentists, nurses, and hospitals, in the fixed Federal maximums of \$6 per adult recipient and \$3 per child.

Heretofore, under the 1956 Amendments to the Social Security Act which operated for a little more than a year (from July 1, 1957, to October 1, 1958), assistance payments for medi-

Table 1. Federal financial participation in public assistance expenditures for States, Territories, and the District of Columbia, October 1, 1958, to June 30, 1961

State	Federal participation (percent)	State	Federal participation (percent)	State	Federal participation (percent)
Alabama	65.00	Kentucky	65.00	North Dakota	65.00
Alaska	50.00	Louisiana	65.00	Ohio	50.00
Arizona	63.23	Maine	65.00	Oklahoma	65.00
Arkansas	65.00	Maryland	50.00	Oregon	52.58
California	50.00	Massachusetts	50.00	Pennsylvania	50.00
Colorado	53.42	Michigan	50.00	Rhode Island	50.00
Connecticut	50.00	Minnesota	58.57	South Carolina	65.00
Delaware	50.00	Mississippi	65.00	South Dakota	65.00
District of Columbia	50.00	Missouri	53.42	Tennessee	65.00
Florida	59.68	Montana	51.07	Texas	61.36
Georgia	65.00	Nebraska	63.41	Utah	65.00
Hawaii	50.00	Nevada	50.00	Vermont	65.00
Idaho	65.00	New Hampshire	57.91	Virginia	65.00
Illinois	50.00	New Jersey	50.00	Washington	50.00
Indiana	50.00	New Mexico	65.00	West Virginia	65.00
Iowa	63.23	New York	50.00	Wisconsin	54.60
Kansas	60.78	North Carolina	65.00	Wyoming	50.92

SOURCE: Reference 3.

cal care were made by States either directly to recipients or to recipients and vendors combined or to vendors directly on behalf of a needy person, within fixed limits to which the Federal funds could be applied.

The types of medical care covered included practitioners' services, hospitalization, drugs, nursing-convalescent home care, dental services, nursing services, clinic services, prosthetic appliances, ambulance or other transportation, laboratory, and X-ray services.

A comparison of January 1957 with January 1958 shows that in each of the four programs using public assistance medical care (old-age

assistance, aid to dependent children, aid to the blind, and aid to the permanently and totally disabled), the number of States using the vendor method of payment for medical services increased in all but one of the types of medical care: nursing homes for the aged and for the disabled (5). For the same period, the total amount of all vendor payments increased also, but the number of cases for which only vendor payment was made decreased.

Table 2 compares the amount of vendor payments for medical care and the number of cases in which vendor payments only were made for January 1957 (under the old system of com-

Table 2. Number of cases receiving only vendor medical payments and amount of vendor medical payments for two selected months, January 1957 and January 1958

Program	January 1957		January 1958	
	Number of cases	Vendor payments	Number of cases	Vendor payments
Total	20,381	\$17,567,727	8,973	\$19,740,122
Old-age assistance	15,927	12,723,559	6,874	13,223,462
Aid to dependent children	884	2,196,307	371	3,719,123
Aid to the blind	397	354,684	163	455,626
Aid to the permanently and totally disabled	3,173	2,293,177	1,565	2,341,911

SOURCE: Reference 5. Based on tables 2 and 5, prepared by the Division of Program Statistics and Analysis, Bureau of Public Assistance, Social Security Administration.

bined money-vendor payments within the specified maximum) and for January 1958 (under the provisions in effect from July 1, 1957, to October 1, 1958, which permitted a choice of the old system or the separate Federal matching vendor program).

Federal participation in direct payments to vendors was first made possible under the 1950 Social Security Amendments (6,7). The amount, however, for medical care in which the Federal Government could participate had to remain within the specified individual matchable assistance payment maximums.

Table 3 gives the total State and Federal vendor payment for medical care from 1951 through 1957, and a breakdown into the categories of use: old-age assistance, aid to dependent children, to the blind, and to the permanently and totally disabled, and general assistance. The increase in vendor medical payments is the result of several factors, among which are the increase in the cost of medical care and the increase in the number of States providing medical care and thus participating in Federal funds.

A pooled fund (in effect a prepayment monthly arrangement per recipient) was used by public assistance agencies within some States to permit greater flexibility in individual medical care cases. The averaging of costs made possible through the pooled fund arrangement helped to some extent to meet increasing medical needs and costs. The funds available for medical care for needy persons were limited, and

only a few States took advantage of Federal contributions to offset such costs.

In fiscal year 1957, only about 10 percent (\$288 million) of the total \$3 billion expended for public assistance went to vendors directly. About 20 percent of the \$288 million, or 2 percent of the total came from Federal funds. Most vendor payments were made by a few States with the greatest resources. For example, more than half of the vendor payments for aged persons in June 1956 were made in three States: New York, Illinois, and Massachusetts. A few States made vendor payments entirely from State and local funds (8).

To increase funds for medical care for the needy, the Social Security Act was amended again in 1956 (9), effective July 1, 1957, fixing Federal matching maximums for medical care at $\frac{1}{2}$ the product of \$6 times the number of adult recipients and $\frac{1}{2}$ the product of \$3 times the number of child recipients per month. This provision for fixed Federal matching for medical vendor payments was supported by many professional and medical organizations.

Before the 1956 Amendments were put into effect, and because the new fixed maximum vendor payments would penalize some States, new legislation was passed in July 1957 (10). Under the legislation, it was optional with a State whether it use the combined money-vendor payments within the specified maximum or whether it claim separate Federal matching for vendor-medical care payments. Only two States, Illi-

Table 3. Total vendor payments for medical care and distribution by categories of use for fiscal years 1951-57 (in thousands)

Fiscal year	Total	Category of use				
		Old-age assistance	Aid to dependent children	Aid to the blind	Aid to the permanently and totally disabled	General assistance
1951.....	\$100, 745	\$35, 860	\$9, 940	\$954	\$1, 362	\$52, 629
1952.....	119, 147	51, 859	11, 067	1, 513	6, 082	48, 626
1953.....	154, 357	73, 864	14, 433	2, 145	11, 532	52, 383
1954.....	175, 436	87, 406	15, 561	2, 489	15, 290	54, 690
1955.....	211, 799	104, 538	19, 005	2, 865	19, 167	66, 174
1956.....	252, 578	130, 514	23, 034	3, 431	23, 869	71, 731
1957.....	288, 005	155, 935	26, 845	4, 330	27, 549	73, 347

SOURCE: Assistance Analysis Branch, Division of Program Statistics and Analysis, Bureau of Public Assistance, Social Security Administration, October 1958.

Table 4. Computation of Federal sharing for public assistance under old and new formulas, per recipient ¹

Type of payment	Old formula: separate vendor payments ²			
	State A	State B	State C	State D
Money payments (total)-----	\$79, 650	\$47, 450	\$81, 600	\$29, 670
Number recipients-----	1, 000	1, 000	1, 000	1, 000
Average money payment-----	\$79. 65	\$47. 45	\$81. 60	\$29. 67
Vendor payments (total)-----	\$20, 100	\$6, 000	\$18, 150	0
Number recipients-----	1, 000	1, 000	1, 000	-----
Average vendor payment-----	\$20. 10	\$6. 00	\$18. 15	-----
Federal maximums:				
Money payments excess \$60 per recipient (total)-----	\$32, 200	0	\$32, 200	0
Number recipients-----	1, 000	-----	1, 000	-----
Average excess-----	\$32. 20	-----	\$32. 20	-----
Average per recipient within Federal maximum:				
Money payment-----	³ \$47. 45	⁴ \$47. 45	³ \$49. 40	⁴ \$29. 67
Vendor payment-----	\$6. 00	\$6. 00	\$6. 00	0
Total-----	\$53. 45	\$53. 45	\$55. 40	\$29. 67
Federal share:				
Money payment:				
$\frac{1}{2}$ first \$30-----	\$24. 00	\$24. 00	\$24. 00	\$23. 74
$\frac{1}{2}$ balance-----	⁵ \$8. 72	⁵ \$8. 72	⁵ \$9. 70	0
Total-----	\$32. 72	\$32. 72	\$33. 70	\$23. 74
Vendor payment:				
$\frac{1}{2}$ \$6-----	\$3. 00	\$3. 00	\$3. 00	0
Total-----	\$35. 72	\$35. 72	\$36. 70	\$23. 74
New formula: money and vendor payments combined ⁶				
	State A ⁷	State B ⁸	State C ⁹	State D ⁸
Money payments-----	\$79, 650	\$47, 450	\$81, 600	\$29, 670
Vendor payments-----	\$20, 100	\$6, 000	\$18, 150	0
Total-----	\$99, 750	\$53, 450	\$99, 750	\$29, 670
Number recipients-----	1, 000	1, 000	1, 000	1, 000
Average money-vendor payment-----	\$99. 75	\$53. 45	\$99. 75	\$29. 67
Amount within Federal maximum-----	\$65. 00	\$53. 45	\$65. 00	\$29. 67
Federal share:				
$\frac{1}{2}$ first \$30-----	\$24. 00	\$24. 00	\$24. 00	\$23. 74
Federal percent balance-----	¹⁰ \$20. 82	¹¹ \$15. 24	¹² \$17. 50	0
Total-----	\$44. 82	\$39. 24	\$41. 50	\$23. 74
Change from old formula-----	+\$9. 10	+\$3. 52	+\$4. 80	0

¹ Calculations based on table 4, Explanation of 1958 Amendments, Social Security Administration, Bureau of Public Assistance, September 1958 (mimeographed). ² In effect until October 1, 1958. ³ Average money payment minus average excess. ⁴ Same as average money payment. ⁵ One-half the difference between the average Federal maximum money payment and first \$30. ⁶ Effective October 1, 1958. ⁷ Federal percentage based on per capita income: 59.5 percent. ⁸ Federal percentage: 65 percent. ⁹ Federal percentage: 50 percent. ¹⁰ 59.5 percent of \$35 difference between amount within Federal maximum and first \$30. ¹¹ 65 percent of \$23.45 difference. ¹² 50 percent of \$35 difference.

bined money-vendor payments (within the specified maximum) and for January 1953 (under the provisions in effect from July 1, 1957, to October 1, 1958, which permitted a choice of the old system or the separate Federal matching vendor program).

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Fiscal year	Total	Category of use				
		Old-age assistance	Aid to dependent children	Aid to the blind	Aid to the permanently and totally disabled	General assistance
1951.....	\$108,745	\$35,860	\$9,940	\$954	\$1,362	\$52,629
1952.....	119,147	51,859	11,067	1,513	6,082	48,626
1953.....	154,357	73,864	14,433	2,145	11,532	52,383
1954.....	175,436	87,406	15,561	2,489	15,290	54,690
1955.....	211,799	104,588	19,005	2,865	19,167	66,174
1956.....	252,578	130,514	23,034	3,431	23,869	71,731
1957.....	288,005	155,935	26,845	4,330	27,549	73,347

SOURCE: Assistance Analysis Branch, Division of Program Statistics and Analysis, Bureau of Public Assistance, Social Security Administration, October 1958.

believes that the present law should be amended so as to make child welfare services generally available not only in rural areas but also in urban areas and to give equal consideration to children in urban areas as to children in rural areas."

This change does away with inequities in the prior law, since 3 out of 5 children in the Nation now live in urban areas, and the rural-to-urban shift in population continues.

The allotment formula has been modified accordingly, so that allotments of child welfare funds will be in direct proportion to the total population under 21 years of age and in inverse proportion to State per capita income, with the protective proviso that no State shall receive less than it would have prior to the amendments of 1958 under an appropriation of \$12,000,000. Previously, allotment was primarily on the basis of rural child population under the age of 18. Furthermore, the new statute requires that Federal child welfare funds be matched with State and local funds beginning with fiscal 1960. Heretofore States were required to pay "part of the cost" for services in predominantly rural areas.

The Children's Bureau, beginning with the nationwide conference of State public welfare administrators, held early in October 1958, is giving special help to the State agencies in regard to the amendments, particularly as they affect the extension of services to urban areas (11). The Federal share and the allotment percentage for each State under the new formula has been published in the Federal Register (12). The Handbook for Child Welfare Services has already been revised to reflect the changes in Federal policy produced by the amendments which are now in effect.

An Advisory Council on Child Welfare Services has also been established, under the amendments, to make recommendations to the Secretary of Health, Education, and Welfare on the effective extension of child welfare services beyond rural areas. It is also to be composed of 12 members, appointed by the Secretary, and representing voluntary, civic, religious, and professional welfare organizations and the public (1d). It is to report its findings and recommendations not later than January 1, 1960.

Hospitalization for OASI Beneficiaries

The House Ways and Means Committee, in its report on the Social Security Amendments of 1958, took cognizance of the needs of the aged for hospital and nursing services. It referred to the various bills introduced into the 85th Congress that would broaden the old-age, survivors, and disability insurance program to provide payment for such services to OASI beneficiaries. In its public hearings on social security (2g), the committee heard testimony to the effect that "under existing arrangements, insurance against the costs of needed hospital and nursing home services is out of reach of many older people," and concluded that "there appears to be a need for making this protection available to older people."

However, the committee believed that before legislation could be considered or recommendations entertained, a study of the practicability and costs and of alternative methods of providing such protective insurance to OASI beneficiaries was needed. The alternatives, the committee held, should include a possible prepayment plan whereby a worker, during his years of employment, could make additional social security contributions which would be used to buy hospital and nursing care insurance from private and nonprofit health insurance organizations. For each of the alternatives considered in the study, there should be an evaluation of the cost of the benefits and the administrative implications.

The committee asked the Secretary of Health, Education, and Welfare to conduct such a study and report back to Congress by February 1, 1959.

Summary

The Social Security Amendments of 1958 provide for a revision of the financial structure of the OASI program through increased benefits and an increase in the maximum earnings tax base. They also provide for improvements in the protection of disabled OASI recipients.

In public assistance, new principles of average maximum matchable payments and variable grants based on per capita income have been introduced. Separate matching for ven-

nois and New Hampshire, chose to continue using the old system of combined payments within the specified maximum, for selected adult programs. Illinois continued it for the aged, blind, and disabled payments, and New Hampshire for the aged and disabled.

However, separate Federal matching for vendor medical payments did not allow the States sufficient flexibility in providing medical care for the needy, and was eliminated with the 1958 legislation. In place of a money payment maximum of \$60 and a maximum of \$6 per vendor medical care payments for adults, and \$32 and \$3 respectively for children, there is an average maximum for all public assistance (including medical care payments) of \$65 for adults and \$30 for children in which the Federal Government participates.

Table 4 compares the method of computation of Federal sharing under the old formula in effect until October 1, 1958 (separate money and vendor medical payments), and under the 1958 amendment (combined money and vendor medical payments), effective October 1, 1958.

The 1958 amendment gives the State greater flexibility in allocating funds for medical care between recipients and vendors without loss in Federal funds. The decision on method of payment for medical care can rest on the State's determination of what is best for the recipient and for its own administration.

Under the new amendment, medical care payments are still available to public assistance recipients, with Federal participation, but the amount and method of payment are determined by the needs of the State rather than by the policy of the Federal Government. A person whose income is sufficient to meet all but medical needs can be counted as a recipient for the total public assistance average in which the Federal Government will participate, if he is also established as a case of need, under the standards of assistance of each State. That is, States may now get the higher Federal matching provided for the first fraction ($\frac{4}{5}$ of \$30 for adults and $\frac{14}{17}$ of \$17 for children) in cases receiving vendor medical payments only, provided that a State has validly established that these persons are eligible for public assistance.

According to the House Report (2e), "This change will enable a State to decide to what

extent it wishes to pay for medical care received by the needy through the method of making a payment in his behalf to the vendor of the medical care or giving him money so that he can purchase his own medical care, without being influenced by consideration of Federal financial sharing."

An Advisory Council on Public Assistance, appointed by the Secretary of Health, Education, and Welfare, has been established to review the existing public assistance programs in relation to old-age, survivors, and disability insurance, the fiscal capacities of the States and the Federal Government, and any other factors relating to the amount and proportion of State and Federal sharing in the public assistance program (1c). It is to be composed of the Commissioner of Social Security and 12 other persons, including employer and employee representatives and experts in State and Federal administrative and fiscal programs. It is to report back to the Secretary not later than January 1, 1960.

Maternal and Child Welfare

Maternal and child health services, crippled children's services, and child welfare services (the three grant programs covered by title V of the law) have all received substantial increases in annual authorized appropriations, and to that extent the changes are significant for the national health outlook. The increases in annual amounts authorized are as follows: maternal and child health services, from \$16,500,000 to \$21,500,000 (30.3 percent); crippled children's services, from \$15,000,000 to \$20,000,000 (33.3 percent); and child welfare services, from \$12,000,000 to \$17,000,000 (41.7 percent).

Certain child welfare provisions in the old law have been eliminated. Provisions specifying the use of Federal child welfare funds in predominantly rural areas or other areas of special need have been set aside; services are now extended to urban and rural children on the same basis.

According to the House Report (2f), "Many families have shifted in the last decade from farms and small towns to cities where services have not expanded to meet their needs. In the light of these developments, your committee

A Migrant Labor Crisis in Immokalee

WILSON T. SOWDER, M.D., M.P.H., and JOSEPH LAWRENCE, M.D.

SHORTLY BEFORE Christmas in 1957, temperatures in many parts of Florida fell below the freeze level, the lowest they had been in 40 years. The freeze damaged the citrus crop and wiped out vegetable plantings. When growers planted new vegetable crops, these were flooded and rotted by unseasonable rains. The weather not only cost the growers a fortune but brought destitution to thousands of migrant laborers who came to work the crops.

Their plight was especially pressing in the area of Immokalee, an unincorporated town with about 3,000 permanent residents. Immokalee lies removed from the opulent Florida "Gold Coast," below Lake Okeechobee, in Collier County, which is twice the size of Rhode Island, with a total population of about 14,000.

Spoken of as "the last frontier" in Florida, Immokalee is little more than a row of buildings briefly flanking a broad highway, hemmed in by large landholdings and the waters of the Everglades. Ponds or puddles covered much of the town. Of its 1,200 houses, only 5 percent are in good condition. About 85 percent are best described as shacks. In season, this town typically is called on to accommodate 8,000 migrant farm laborers and their families.

Most of the so-called labor camps in the district are in deplorable condition. Shallow wells provide the water supply. There are a few septic tanks and many privies, but many

dwelling lack toilets of any kind. There are no garbage collections.

A single health department serves both Collier and adjoining Lee County (population 38,000). The health department operates a fairly well-equipped clinic in Immokalee in a building about 25 by 50 feet. (A new modern health center is being constructed under the Hill-Burton program.) Normally this clinic receives about 25 patients daily and sees about 20 expectant mothers weekly.

The usual staff of the health department, numbering 11 in Collier County, was augmented by special funds obtained from the Children's Bureau and the State for health work with migrants. In addition, one nurse, a physician, and a sanitarian were recruited for the period of crisis. The staff included an interpreter to speak with the migrants of Spanish culture, from Puerto Rico, Mexico, or Texas, at least a fourth of the total.

Late in December the editor of the town weekly was asked by several hungry migrants for something to eat. He found more than 60 families in desperate need of warm clothing and food. On December 27 he telegraphed the Governor of the State to ask for assistance. Pursuant to this appeal, on January 2, the Red Cross declared Immokalee a disaster area.

In the absence of a welfare office, the health department was asked to certify needy residents to be eligible for supplies of Federal surplus food. The clinic was swamped with applicants, and clerks were recruited from the office of the county commissioners to free the health department staff for normal duties.

Meanwhile, Miami and Tampa newspapers and national broadcasts stimulated donations of tons of food and clothing and several thou-

Dr. Sowder is State health officer of the Florida State Board of Health and Dr. Lawrence, health officer of Lee and Collier Counties. This article is based on a paper presented by Dr. Sowder and Dr. Lawrence before the Southern Branch, American Public Health Association meeting on May 8, 1958, at Little Rock, Ark.

dor medical payments has been eliminated. An advisory council has been established to review existing public assistance programs, and the fiscal capacities of State and Federal Governments with respect to the public assistance program.

For the three programs under title V of the Social Security Act (maternal and child health, crippled children's, and child welfare services), increased annual appropriations have been authorized.

In child welfare, financial allotments on the basis of the rural child population have been eliminated, and services will now be extended to urban and rural children on the same basis. Beginning with fiscal 1960, Federal child welfare funds will be matched with State and local funds. An advisory council has been established to make recommendations on the effective extension of child welfare services beyond the rural areas.

The House Ways and Means Committee requested the Department of Health, Education, and Welfare to study the hospital and home nursing needs of the aged OASI beneficiaries. The study is to include practicability and costs of protective insurance and alternative methods of providing it. The study is to be completed by February 1, 1959, and made available to Congress.

REFERENCES

- (1) Public Law 85-840 (H. R. 13540), 72 Stat. 1013, (a) Title I-VII; (b) Title IV, Sec. 401a-c; (c) Title VII, Sec. 704a-d; (d) Title VII, Sec. 705a-d.
- (2) U. S. Congress House Committee on Ways and Means: *Social Security Amendments of 1958*. Report No. 2288 (85th Cong., 2d Sess.). Washington, D. C., U. S. Government Printing Office, 1958, (a) p. 4; (b) p. 10; (c) p. 5; (d) pp. 40-41; (e) p. 40; (f) pp. 43-44; (g) p. 6.
- (3) U. S. Social Security Administration: *State assistance expenditures. Federal percentage*. 23 Fed. Reg. 7150 (1958).
- (4) U. S. Social Security Administration Division of Program Research: *Total and per capita personal income, 1957*. Research and Statistics Note No. 30, Sept. 12, 1958. Washington, D. C., 1958. Mimeographed.
- (5) U. S. Bureau of Public Assistance: *Medical care in public assistance: Information relating to changes, early 1957 to January 1958*. State Letter No. 333, April 8, 1958. Washington, D. C., 1958. Mimeographed.
- (6) Mushkin, S. J.: *Medical services and the Social Security Amendments of 1950*. Pub. Health Rep. 66: 98-114, Jan. 26, 1951.
- (7) Dearing, W. P.: *Medical care for public assistance recipients*. Pub. Health Rep. 66: 89-97, Jan. 26, 1951.
- (8) U. S. Department of Health, Education, and Welfare: *Annual report for 1957*. Bureau of Public Assistance Reprint. Washington, D. C. U. S. Government Printing Office, 1958, pp. 5-7.
- (9) Public Law 880, 84th Cong., 2d Sess., 70 Stat. 807.
- (10) Public Law 85-110, 71 Stat. 308.
- (11) U. S. Department of Health, Education, and Welfare: *How the principal new or expanded programs of the Department of Health, Education, and Welfare will be put into operation*. Memorandum released at Secretary's conference, September 10, 1958. Washington, D. C., 1958. Mimeographed.
- (12) U. S. Social Security Administration: *Promulgation of Federal shares and allotment percentages for purposes of child welfare services under title V, part 3, of the Social Security Act, as amended*. 23 Fed. Reg. 7332 (1958).

plies and a long-term program of housing and sanitation. In the interest of health, they recommended an emergency sanitation and cleanup campaign, using the labor available in the community. The Governor and Cabinet, sitting as a budget commission, granted \$15,000 to purchase food and \$30,000 for the emergency work, promptly labeled by the press as a "Baby WPA."

Within a few hours, the county health officer was advised that he had responsibility for directing the emergency project. The funds became available on February 4, and the project was scheduled to start on February 11. On that day, work began with 37 hands.

In the meanwhile, a squad of State employees, including an entire class of sanitation trainees, had been sent to Immokalee to assist in developing the operation. Meeting on February 6 with local officials, the director decided to recruit one person from a family, with priority to heads of the largest families, and pay him \$5 a day, \$1 below the prevailing wage offered by local growers. It was planned to spend \$2,000 a week for 12 weeks, allowing each family at most 1 or 2 days employment per week.

Workers were identified by metal tags, and wages were paid on the spot at the end of each day, in silver dollars. (Most of these dollars were used to pay for groceries or gasoline, or to



To erase the health hazard from the tremendous amount of refuse in Immokalee's vacant lots and yards, the project opened with a sanitation and cleanup campaign using migrant labor teams.

support the churches.) To be eligible for re-employment, workers were also required to report for typhoid immunization shots.

As the Governor had directed other State agencies to assist the project, there was an ample supply of trucks with drivers, shovels, picks, lazy boys, rakes, hoes, and other equipment, including an airplane to carry the State health officer to Immokalee on missions of inspection.

The sanitation work was mapped out by a sanitary engineer and aides. He indicated the areas to be drained, direction of ditches, and areas to be filled. Sanitation trainees surveyed the town to appraise housing, water sources, and sewage disposal. By the end of February, plans were well enough established that most of the State health department employees were removed.

One of the first tasks of the work crews was to haul garbage, rubbish, and trash from yards and streets. They collected about 25 truckloads every day for 2 months. Others completed about 20,000 feet of drainage ditches, so that the town is now dry for the first time in its history. Spraying and rat-trapping, directed by an entomologist from the State office, reduced the vector population.

A few people continued to work on a plan to convert the grounds of a school used by Negro children into a recreational area and laundry facility. The ground level was raised by several dozen loads of dirt, the basketball court



Migrant laborers dug ditches and drained impounded water in the Immokalee area, cutting down the vector population considerably. Whether the town remains dry depends not only on the weather but on the townspeople keeping ditches free of trash.

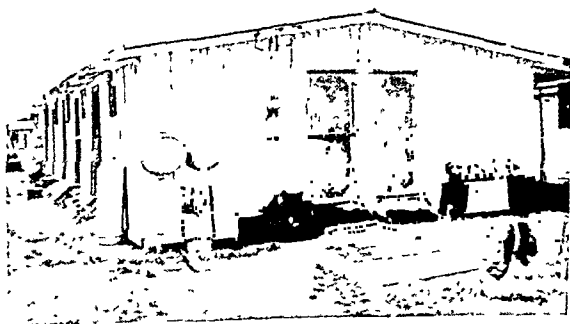
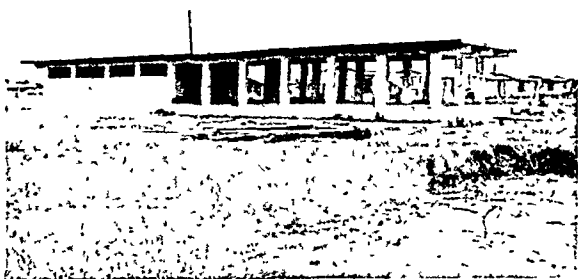
sands in cash. Ample supplies of antibiotics, vitamins, and baby foods were contributed by manufacturers. Soup kitchens were set up by local churches and the Salvation Army, and on January 9 the first regular deliveries of food were received by needy families. These continued through April.

The donations were given over to the management of a long-standing local committee on migrants, under chairmanship of a local minister. The committee set up a register of needy persons, both local and migrant. More than half of the migrants by this time had left the area.

The first rise in demand for medical services began in January. The illness consisted mainly of diarrhea among children and obvious effects of malnourishment of infants and chil-



Women migrant workers played a stellar role in the health project. They are shown here whitewashing a house, one activity of many which left the town tidier and more livable than ever before.



A tangible product of Immokalee's emergency project is the new community building in construction (top). Beneath is a migrant shack which housed eight families. Entrances to individual apartments are on the left.

dren. On January 16 a Public Health Service physician, on assignment to the central office of the Florida State Board of Health, was sent to Immokalee so that a doctor would be on call around the clock. The clinic was then receiving about 100 patients daily.

Reports of two cases of paratyphoid fever sparked an immunization campaign. To explain the need for inoculations leaflets in the Spanish language were circulated through food distribution centers. A sound truck traveled through the community urging all to come to the health department for protection. In 6 weeks the clinic performed about 3,000 complete typhoid immunizations. The least response came from the permanent residents of the town.

On January 30, at the request of the Governor, the adjutant general of the Florida National Guard and the State health officer personally investigated Immokalee, in company with the director of the Florida State Department of Public Welfare. They found no one in need of medical services who had not obtained them. Free hospitalization had been provided under the State-County indigent hospitalization program, available even to nonresident patients. Food supplies were found to be adequate, but not completely satisfactory, as many families missed their customary diet.

The investigators recommended to the Governor the purchase of supplementary food sup-

Sanitary Engineering Degrees Awarded in 1957

Institution	Doc- tor's	Mas- ter's	Bache- lor's	Institution	Doc- tor's	Mas- ter's	Bache- lor's
Alabama Polytechnic Institute.....		0	¹ 7	New York University.....	0	4	2
Alabama, University of.....		0	0	North Carolina State College.....	0	2	0
Arkansas, University of.....		2	0	North Carolina, University of.....		¹ 9	0
California Institute of Tech- nology.....	0	¹ 2	4	North Dakota, University of.....		2	
California, University of.....	2	¹ 14	3	Northeastern University.....		0	
Case Institute of Technology.....	0	1		Northwestern Technological Institute.....	0	¹ 5	5
Cincinnati, University of.....	0	0	0	Ohio State University.....	0	3	1
Colorado, University of.....		0	5	Oklahoma State University.....		0	2
Connecticut, University of.....	0	0		Oklahoma, University of.....	0	¹ 6	0
Cornell University.....	0	1		Oregon State College.....	0	1	
Florida, University of.....	0	1	4	Pennsylvania State Univer- sity.....	0	2	3
Georgia Institute of Tech- nology.....	0	2	10	Purdue University.....	¹ 2	4	1
Harvard University.....	1	¹ 11		Rensselaer Polytechnic Insti- tute.....		0	3
Idaho, University of.....		0		Rutgers University.....	0	0	1
Illinois Institute of Technology.....		0	0	South Dakota State College.....		0	3
Illinois, University of.....	0	8	6	Southern California, Univer- sity of.....		1	
Iowa State College.....	0	1	1	Southern Methodist Univer- sity.....		2	
Iowa, State University of.....	0	1	6	Tennessee, University of.....		2	
Johns Hopkins University.....	2	¹ 8	0	Texas, Agricultural and Me- chanical College of.....	0	¹ 2	
Kansas, University of.....		0	¹ 5	Texas Technological College.....		0	3
Kentucky, University of.....		0		Texas, University of.....	1	¹ 5	
Maine, University of.....		0	5	Tulane University of Louisi- ana.....		2	1
Manhattan College.....			19	Utah, University of.....		1	0
Massachusetts Institute of Technology.....	3	¹ 15		Virginia Polytechnic Institute.....	0	1	1
Massachusetts, University of.....		0		Washington, State College of.....	0	1	0
Michigan College of Mining and Technology.....		0	¹ 11	Washington University.....		¹ 4	
Michigan State University.....	0	4		Washington, University of.....		3	0
Michigan, University of.....	0	5	1	West Virginia University.....		0	2
Minnesota, University of.....	0	¹ 4		Wisconsin, University of.....	0	5	
Mississippi State College.....		0	¹ 19	Wyoming, University of.....		0	
Missouri School of Mines and Metallurgy.....		1	3				
Missouri, University of.....		¹ 2	1				
Nebraska, University of.....		0	0				
Newark College of Engineering.....	0	2	7				
New Hampshire, University of.....		0					
				Total.....	11	152	145

¹ Includes foreign nationals. Leaders (----) indicate no specialization offered at this level.

During the period of July 1956 through June 1957, graduate degrees in sanitary engineering were conferred on 163 individuals by institutions in the United States: 152 master's

degrees and 11 doctor's degrees. In the same period, 145 students completed undergraduate programs specializing in sanitary engineering.

Prepared by Frederick K. Erickson, S.M., and Frank A. Butrico, M.S.S.E., Office of Engineering Resources, Division of Sanitary Engineering Services, Public Health Service. Mr. Erickson is sanitary engineer director, and Mr. Butrico, chief of the office.

The tabulation above shows the institutions in the United States awarding sanitary engineering degrees and the number and level of the degrees conferred, irrespective of the nomenclature of the degree. The totals are those reported by the institutions. A list of all schools offering such training is available from the authors. Similar data for the period since

was repaired and given a blacktop surface, and a baseball diamond was laid out. A new community building, 20 by 80 feet, of cement block, will house toilets, showers, laundry tubs, and a recreation hall.

Many wild dogs that haunted the town were caught and impounded as a phase of the program. Those unclaimed for 3 days were sent to the Miami Humane Shelter.

Women, who headed many needy families, were engaged in special projects of whitewashing houses, cleaning yards, home care for the disabled, gardening, staffing food distribution centers, attending children, and other light work. They also distributed handbills for the immunization campaign.

Perhaps the most important gain fostered among these women was their response to the health information offered by the public health nurses and others in the department. This gain promises to be at least as permanent as the

new gardens, the whitewashed walls, and the disposal of trash and garbage.

Another significant effect of the crisis is that the local physician, who was on the point of seeking another situation, has agreed to work for the county on a part-time basis and to remain in practice in Immokalee. The State hopes to develop a plan whereby hospitals and medical schools will assign general practice residents to this area for a few months at a time.

The manner in which this small county health unit handled a community crisis with disastrous possibilities was materially influenced by the public response to the facts reported by the local editor, by the availability of Federal surplus foods, by the law providing hospitalization of the indigent, the State mosquito control program, Federal and State support for health services for migrants, and other resources of the State.

National Conference on Homemaker Services

A national conference on homemaker services, designed to stimulate development of these services throughout the Nation, will be held February 10-11, 1959, in Chicago. This multidiscipline conference is sponsored by 26 national voluntary agencies and by the Office of the Commissioner, the Bureau of Old-Age and Survivors Insurance, the Bureau of Public Assistance, and the Children's Bureau, of the Social Security Administration; the Public Health Service; the Office of Vocational Rehabilitation; the Office of Education; and the Special Staff on Aging of the Office of the Secretary of Health, Education, and Welfare.

Twelve preconference study groups have scheduled meetings in various cities to prepare policy statements on the development and operation of homemaker services. Other preconference materials include a pamphlet explaining homemaker services; descriptions of different types of such programs; and a nationwide survey of agencies supplying the services.

Conference chairman is Mrs. R. Livingston Ireland, director of the Ohio Department of Public Welfare and executive secretary is Mrs. Lucille M. Smith, chief of Health Services Organization Branch, Division of Public Health Methods, Public Health Service.

ter's degrees per year for the 10 years 1948-57. The average number of master's degrees conferred per year for the 10-year period 1947-56 was 133, and for the 5-year period 1952-56, 117.

Doctor's Degrees

Six institutions in 1957 awarded a total of 11 doctor's degrees, conferring 10 on United States citizens. Twenty-six other institutions offering sanitary engineering training at the doctorate level reported no doctor's degrees awarded.

Three of these 6 schools have awarded one or more doctor's degrees each year for the past 5 years and during that period have accounted for over 60 percent of the doctorates in sanitary engineering. For the 10-year period 1947-56,

the average number of doctor's degrees per year was 6.3, and the average for the 5 years 1952-56 was 8.6 degrees.

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- (2) Miller, A. P.: Sanitary engineering degrees given in 1954. Pub. Health Rep. 70: 1039-1040, October 1955.
- (3) Laubusch, E. J., and Ludwig, H. F.: Sanitary engineering degrees awarded in 1955. Pub. Health Rep. 71: 945-946, September 1956.
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Division of Public Health Nursing

A Division of Public Health Nursing has been established in the Bureau of State Services.

The new division, as a focal point for public health nursing in the Public Health Service and through its consultative services, provides leadership in extending and improving public health nursing services in order to implement public health programs and to plan for the nursing care of ill and disabled persons who are at home.

Through its working relationships with State and national groups it represents the Public Health Service in the development of public health nursing standards of preparation and practice.

The Division of Public Health Nursing staff arranges for assigning public health nurses to educational institutions and field agencies for career development purposes and gives professional guidance to public health nurses assigned to the various programs within the Public Health Service. It conducts research in relation to public health nursing practice and advises on studies conducted by State and local agencies.

Officials of the Division of Public Health Nursing are Margaret G. Arnstein, chief; Zella Bryant, deputy chief; Frances E. Taylor, chief of Training and Career Development Branch; Doris E. Roberts, chief of the Operational Research Branch; Dr. Marion Ferguson, consultant in studies; and Mary Vesta Marston, consultant in operational research.

Engineering degrees awarded annually, by type of degree, 1951-57

Year	Number sanitary engineering degrees	Schools awarding sanitary engineering degrees	Schools offering sanitary engineering curriculums	Total number engineering degrees ¹	Number sanitary engineers per 1,000 engineering degrees
Bachelor's degrees					
1957-----	145	31	43	27,748	5.2
1956-----	208	32	53	23,547	8.8
1955-----	141	32	44	20,200	7.0
1954-----	164	32	40	19,707	8.3
1953-----	216	36	41	21,642	10.0
1952-----	216	36	41	27,155	8.0
1951-----	244	35	39	37,904	6.4
Master's degrees					
1957-----	152 (39)	41	64	5,203	29.2
1956-----	124 (31)	33	67	4,678	26.5
1955-----	134 (34)	33	53	4,444	30.2
1954-----	120 (25)	30	56	4,130	29.1
1953-----	102 (20)	25	57	3,726	27.4
1952-----	105 (22)	29	57	4,132	25.4
1951-----	152	26	57	5,134	29.6
Doctor's degrees					
1957-----	11 (1)	6	32	596	18.5
1956-----	9 (1)	7	27	610	14.8
1955-----	11 (2)	4	28	599	18.4
1954-----	9	5	26	590	15.3
1953-----	5	4	24	592	8.4
1952-----	9	5	23	586	15.4
1951-----	7	4	25	586	11.9

¹ See Armore, S. J., and Armsby, H. H.: Engineering enrollments and degrees in ECPD-accredited institutions: 1957. *Journal of Engineering Education*, vol. 48, No. 6, February 15, 1958, pp. 415-432.

NOTE: Figures in parentheses represent nationals of other countries included in larger figure.

1889 appear in the literature (1-4) or have been distributed by the Public Health Service.

Comparative data on the conferment of degrees for the years 1951-57 are given in the tabulation above.

Undergraduate Degrees

Forty-three institutions offered a program in sanitary engineering during the academic year 1956-57. Of these schools, 31 reported 145 graduates had received undergraduate training toward the bachelor's degree in sanitary engineering or had a sanitary engineering major or option. The average number of graduates per

year for the 10-year period 1947-56 was 200 and for the 5-year period 1952-56, 189.

Master's Degrees

Of the 64 colleges and universities offering graduate training in sanitary engineering, 23 schools, or 36 percent, reported no graduates. The remaining 41 schools awarded 113 degrees to United States citizens and 39 degrees to foreign nationals.

The bulk of training in 1957 was done by 16 schools. These schools trained 111 students and had 4 or more graduates per school. Of these 16 schools, 7 have averaged over 5 mas-

not until 1930 that Meyer and his co-workers isolated the etiological agent (2). The largest outbreaks of equine encephalitis ever recorded occurred in 1937 and 1938 when over one-third of a million equine cases with a mortality of 20 percent were reported from the 22 States west of the Mississippi River. Iowa holds the all-time record of 66,000 cases in 1 year (1938). During a recent 5-year period (1952-56), reported cases of equine encephalitis for the 22 western States averaged 1,350 cases per year, according to U. S. Department of Agriculture reports.

When Howitt recovered the WE virus from a child's brain in 1938, it was proved that the term "western equine encephalomyelitis" was a misnomer (3). Three years later the greatest human epidemic of WE occurred. At least 3,000 persons were attacked, including 1,100 in North Dakota. No large epidemic of WE has occurred since 1952, when California reported more than 700 human cases, of which 375 were confirmed as WE (4).

The fatality rate for WE averages from 20 to 30 percent in horses and 5 to 15 percent in humans. Severe and permanent aftereffects can follow the disease, especially in infants. Many cases of this disease occur in infants and to a lesser extent in persons over 50 years old; clinical infections are usually uncommon at the other ages. However, in the 1941 epidemic in North Dakota, about 37 percent of the cases occurred in the age group 15-44 years (5).

Proof that the WE virus could be transmitted by mosquitoes (*Aedes aegypti*) was obtained by Kelser's classic experiments in 1933 (6). It was not until 1941, however, that Hammon and his associates reported the first WE virus isolation from a mosquito in nature, *Culex tarsalis* (7). Since 1941, *C. tarsalis* has been considered the primary vector of WE. To date, the WE virus has been isolated from several hundred pools of this species, collected in 11 States and the Province of Manitoba, Canada. The geographic distribution of *C. tarsalis* corresponds to the general distribution of the WE virus. This vector is common west of the 95th meridian, roughly the 17 western States, and in the entire State of Iowa, where it breeds in great numbers in seeps and grassland surface pools. *C. tarsalis* fits the role of a primary vector very well

because of its abundance in western areas; its tendency to feed readily on a wide range of hosts, including birds, cows, horses, and man (8); and its remarkable laboratory vector efficiency in transmitting the WE virus (9).

Studies made since 1941 show that wild birds are commonly infected with the WE virus. Virus recoveries have been made from approximately 20 species in nature. Domestic fowl also may serve as natural hosts from which mosquitoes become infected.

Factors favoring outbreaks of WE include an abundance of *C. tarsalis*, particularly early in the season. With respect to the epochal outbreak of encephalitis in North Dakota in 1941, it may be significant to note that the year 1941 was the wettest year in the climatologic history of North Dakota, according to a personal communication from F. J. Bavendick, U. S. Weather Bureau, Bismarck, N. Dak. The California epidemic of 1952 was preceded by one of the heaviest snow packs ever recorded on the mountain ranges of this State; the subsequent melting of the snow, coupled with moderate winter and springtime temperatures, resulted in a flood which caused an early season buildup of vector populations (10).

Eastern Encephalitis

Eastern encephalitis was first recognized as a distinct disease entity in 1933 (11, 12). It has since caused intermittent outbreaks among horses, humans, and birds in various sections of eastern United States, principally in coastal States from Massachusetts to Texas.

Eastern encephalitis was first recognized as a disease of man in 1938 in Massachusetts (13, 14). Since 1938, there have been reported less than 100 human cases for the entire Nation, but 50 of these cases have occurred in Massachusetts—34 in 1938, 4 in 1955, and 12 in 1956 (15)—and 18 in Louisiana. In 1957, Florida reported two confirmed human cases of EE for the first time (personal communication from J. O. Bond, Florida State Board of Health, Jacksonville).

Most of the outbreaks among horses have comprised not more than a few hundred cases. One exception was the epizootic in 1947 in Louisiana, when 14,334 cases and 11,722 deaths were reported.

Status of Mosquito-Borne Encephalitis in the United States

LESLIE D. BEADLE, M.A.

MOSQUITO-BORNE encephalitis infections are relatively new diseases from the standpoint of definite knowledge; however, such diseases probably have existed in this country and in other parts of the world for centuries. In the United States the three principal encephalitis viruses—western, eastern and St. Louis—were first isolated in the early 1930's, but there is good evidence that outbreaks of sleeping sickness among horses occurred over 100 years ago. Recently, Hanson described an epizootic of encephalitis, probably the eastern type, among 100 horses in southeastern Massachusetts in 1831 (1).

The present status of the human encephalitis problem is difficult to evaluate because routine reporting of "infectious encephalitis" by physicians is based on clinical symptoms rather than on cause. Encephalitis means inflammation of the brain, but such inflammation can be caused by a host of agents, living and nonliving, including chemicals, protozoa, bacteria, rickettsiae, fungi, and viruses. Our most accurate information on distribution of the mosquito-borne encephalitis viruses and the magnitude of the problem they create is obtained by special studies when epidemics and epizootics occur. During the past 25 years, severe outbreaks in horses and man have occurred periodically in various parts of the United States.

Present knowledge concerning the natural history of these virus diseases indicates that

wild birds are the principal reservoirs of infection and mosquitoes are the vectors. Normally the infection chain is limited to birds and mosquitoes. Under certain conditions, the virus spills over to horses, humans, and other mammals. Man and equines appear to be dead-end hosts and are not important in the natural cycle. There is no evidence that either is a significant source for mosquito infection.

The encephalitis viruses cause infections in a wide range of vertebrate hosts, but in many hosts, such as birds, the infections are apt to be mild or entirely asymptomatic; among humans and horses, they range from the clinically inapparent type to a severe, highly fatal involvement of the central nervous system.

Common symptoms of mild cases in man include a brief fever, malaise, or a headache. Among the more prominent signs and symptoms of severe infections are an abrupt onset, high fever, severe headache, stiff neck, irritability, drowsiness and coma, muscular twitching, and convulsions. The symptoms sometimes are confused with those of poliomyelitis, but residual paralysis is not common.

In this paper the current status of knowledge concerning western encephalitis (WE), eastern encephalitis (EE), and St. Louis encephalitis (SLE) will be briefly reviewed.

Western Encephalitis

The western encephalitis virus has been most active in States west of the Mississippi River and in Wisconsin and Illinois. The "cerebrospinal meningitis" in Idaho in 1897 and the famous Kansas-Nebraska horse plague of 1912 undoubtedly were caused by WE; but it was

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the United States. This type of encephalitis derives its name from the serious epidemic which was centered in St. Louis and St. Louis County, Mo., during the late summer of 1933. More than 1,100 human cases were reported in the city and county.

Distribution of the SLE virus is not so clearly delineated as that of the WE and EE types since the horse does not serve as a sentinel animal for SLE infections. In general, the virus occurs throughout the western and central States. An unusual record was obtained last summer, when the virus was recovered from the spinal fluid of a patient in Plant City, Fla. (personal communication from J. O. Bond, Florida State Board of Health, Jacksonville).

St. Louis encephalitis outbreaks appear to be of two types, rural and urban (29). The rural outbreaks have been mostly in irrigated areas extending from the central valley of California to western Texas. One of the more recent epidemics occurred in the high plains of Texas in 1956; there were at least 250 cases. One characteristic of rural SLE is that it is frequently mixed with WE infections.

Notable epidemics of SLE in urban and sub-urban areas since the historic 1933 outbreak include the following:

Date	Place	Number of cases
1937-----	St. Louis, Mo.-----	500
1954-----	Hidalgo County, Tex.-----	1,000
1955-----	Calvert City, Ky. ¹ -----	13
1956-----	Louisville, Ky.-----	110
1957-----	Cameron County, Tex.-----	130

¹ Population 1,500.

Although all age groups are susceptible to the SLE virus, in many epidemics the incidence has been highest in individuals over 50 years of age. Mortality during recent years has ranged from less than 2 percent to 11 percent.

Current knowledge indicates that *C. tarsalis* is the principal vector of rural SLE in the west and *Culex pipiens-quinquefasciatus* the primary vector for the urban form of the disease in central United States. Several hundred virus isolations have been made from *C. tarsalis* in 8 States. Lumsden, in 1933, implicated *C. pipiens* as the vector of encephalitis in St. Louis (30); and SLE virus isolations were made from the *C. pipiens* complex during outbreaks

in Yakima Valley, Wash., 1942 (31); in Hidalgo County, Tex., 1954 (32); and in Calvert City, Ky., 1955 (33).

C. pipiens-quinquefasciatus mosquitoes are frequently referred to as "dirty water" breeders since they show a predilection for polluted water. Outbreaks of SLE in the lower Ohio Valley in 1955 were associated with heavy production of *C. pipiens* caused by improper disposal of industrial wastes (33). During the Louisville outbreak in 1956, excessive populations of these mosquitoes were produced from an estimated 20,000 to 25,000 street catch basins situated throughout the city.

It is paradoxical that droughts and outbreaks of urban SLE seem to be related. Climatic conditions in the St. Louis area in 1933 were most unusual. According to official Weather Bureau records, the rainfall in St. Louis for the months of June, July, and August was the lowest in its history, since 1837 (34). It should be noted that a dearth of rainfall is not necessarily deleterious to the production of *C. pipiens*, a species that breeds prolifically in sewage disposal areas and other manmade breeding places which may receive an artificial supply of water.

Epidemiological studies have revealed that both wild and domestic birds are commonly infected with the SLE virus. Most of the evidence, however, is based on antibody studies rather than on virus recoveries. To date, the virus has been reported from only two birds in the United States, a mourning dove in California and a flicker in Kentucky (33).

Current Investigations and Control

Intensive investigations on mosquito-borne encephalitis are now underway in various sections of the United States. The primary purpose of these investigations is to acquire detailed information on the natural history of these viruses so that practical control measures can be developed. Some pertinent questions that need to be answered are: What causes the periodic epizootics and epidemics? Is each virus continuously present in an area or is it reintroduced? What is the most feasible approach to the control of encephalitis? What is the epidemic potential for the future?

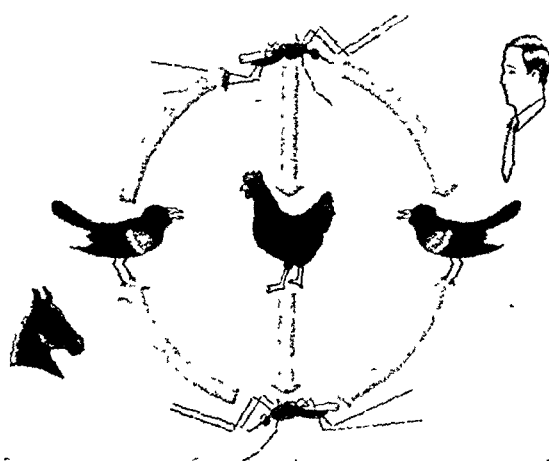
In Florida, a total of 2,219 cases among horses and mules was reported by the U. S. Department of Agriculture for the 23-year period 1935-57. The largest number of cases (368) was reported in 1957. The disease has been reported in all but 2 of the 67 counties of the State, but the majority of cases have occurred in the fresh-water lake region of central Florida.

A unique feature of the eastern virus is that it may cause clinical illness in birds, particularly confined ring-necked pheasants. Since 1938, when the virus was first isolated from the brains of pheasants reared on farms in Connecticut (16) and New Jersey (17), the disease has caused more than 100 outbreaks among pheasant flocks in 8 States, including 1 outbreak in Florida. An interesting epidemiological feature of the malady in pheasants was the finding that the virus can be transmitted mechanically from bird to bird during acts of feather picking and cannibalism, common vices among penned pheasants (18, 19).

Of the three encephalitis viruses, EE is the most virulent. Fatality averages about 90 percent for horses and 60 percent for humans. Approximately two-thirds of the human cases occur in children under 10 years of age. Of the survivors, most do not recover completely.

Recent studies on vectors of EE have implicated the bog mosquito *Culiseta melanura* as the primary vector for maintaining the basic infection chain in nature (bird-mosquito-bird). Proof is lacking, however, that *C. melanura* is responsible for human and horse outbreaks of EE. Certain other mosquitoes, such as *Aedes*, *Psorophora*, and *Mansonia*, are suspected vectors (20). *C. melanura* has been shown to be a laboratory transmitter of the EE virus (21), and 17 natural isolations have been made from pools of this species in Louisiana (22), New Jersey (23, 24), Massachusetts (25), and Alabama (personal communication from R. W. Chamberlain, Public Health Service, Montgomery, Ala.). This mosquito feeds extensively upon birds (24), but the extent to which it feeds on man and horses under natural conditions is unknown.

C. melanura is extremely selective in its breeding places and tends to choose secluded shady sites with cool and acid water in permanent fresh-water swamps. Some of its prin-



Infection chain of the mosquito-borne viral encephalitis.

cipal habitats are sphagnum bogs and cedar swamps (24). In general, the distribution of major fresh-water swamps in this country coincides with the range of the EE virus and *C. melanura*, the principal area being the low-lying coastal plains.

Wild birds are considered to be natural reservoirs of the EE virus. During outbreaks of the disease, approximately one-half of the birds sampled may show immunity against EE, as evidenced by the presence of neutralizing antibody (26). Virus recoveries have been made from about 20 species of wild birds. Domestic fowl are not considered to be important reservoirs of the eastern virus.

An abundance of summer rainfall seems to be a contributory factor in epidemics and epizootics of EE. This is exemplified by outbreaks in Massachusetts: In June and July 1938, the rainfall totaled 16 inches, and in August 1955, following hurricanes Connie and Diane, 17 inches occurred. Normal summer rainfall is 3 to 3.5 inches per month (27). Conversely, prevailing dry conditions tend to inhibit outbreaks. In 1957, when Massachusetts experienced an extreme summer drought, there were no verified clinical cases of EE in pheasants, humans, or horses (28).

St. Louis Encephalitis

St. Louis encephalitis is regarded by some as the most important mosquito-borne disease in

the United States. This type of encephalitis derives its name from the serious epidemic which was centered in St. Louis and St. Louis County, Mo., during the late summer of 1933. More than 1,100 human cases were reported in the city and county.

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Although all age groups are susceptible to the SLE virus, in many epidemics the incidence has been highest in individuals over 50 years of age. Mortality during recent years has ranged from less than 2 percent to 11 percent.

Current knowledge indicates that *C. tarsalis* is the principal vector of rural SLE in the west and *Culex pipiens-quinquefasciatus* the primary vector for the urban form of the disease in central United States. Several hundred virus isolations have been made from *C. tarsalis* in 8 States. Lumsden, in 1933, implicated *C. pipiens* as the vector of encephalitis in St. Louis (30); and SLE virus isolations were made from the *C. pipiens* complex during outbreaks

in Yakima Valley, Wash., 1942 (31); in Hidalgo County, Tex., 1954 (32); and in Calvert City, Ky., 1955 (33).

C. pipiens-quinquefasciatus mosquitoes are frequently referred to as "dirty water" breeders since they show a predilection for polluted water. Outbreaks of SLE in the lower Ohio Valley in 1955 were associated with heavy production of *C. pipiens* caused by improper disposal of industrial wastes (33). During the Louisville outbreak in 1956, excessive populations of these mosquitoes were produced from an estimated 20,000 to 25,000 street catch basins situated throughout the city.

It is paradoxical that droughts and outbreaks of urban SLE seem to be related. Climatic conditions in the St. Louis area in 1933 were most unusual. According to official Weather Bureau records, the rainfall in St. Louis for the months of June, July, and August was the lowest in its history, since 1837 (34). It should be noted that a dearth of rainfall is not necessarily deleterious to the production of *C. pipiens*, a species that breeds prolifically in sewage disposal areas and other manmade breeding places which may receive an artificial supply of water.

Epidemiological studies have revealed that both wild and domestic birds are commonly infected with the SLE virus. Most of the evidence, however, is based on antibody studies rather than on virus recoveries. To date, the virus has been reported from only two birds in the United States, a mourning dove in California and a flicker in Kentucky (33).

Current Investigations and Control

Intensive investigations on mosquito-borne encephalitis are now underway in various sections of the United States. The primary purpose of these investigations is to acquire detailed information on the natural history of these viruses so that practical control measures can be developed. Some pertinent questions that need to be answered are: What causes the periodic epizootics and epidemics? Is each virus continuously present in an area or is it reintroduced? What is the most feasible approach to the control of encephalitis? What is the epidemic potential for the future?

Cause of Periodic Outbreaks

Current information suggests that epidemics and epizootics of mosquito-borne encephalitis are due to a fortuitous set of ecologic conditions, including high prevailing temperatures, heavy mosquito populations, and high rates of virus infections among an abundance of wild birdlife.

High sustained temperatures during the summer months seem to favor outbreaks of encephalitis. Normally the peak months for these outbreaks are July, August, and September. In mild climates, such as Florida and Texas, cases may occur as early as April, May, or June.

Many investigators believe that the most important basic factor in determining whether or not an epidemic would occur in an area is prevalence of the mosquito vector. There is much evidence that a rapid increase in vector populations is usually accompanied by a corresponding increase in virus infection among birds.

A large population of susceptible birds and efficient vectors in the vicinity of man and horses would set the stage for explosive outbreaks of encephalitis. Birds appear to be ideal natural hosts because, as Buescher points out, they are prolific and short-lived (35). This results in a rapid turnover of population with large numbers newly susceptible each year. Smaller birds and nestlings, which circulate high levels of virus in their blood, are probably more important than the larger and older birds in the transmission cycle. In a recent study, it was shown that *C. tarsalis* feeds much more readily on nestling birds than on adults of the same species (36).

Maintenance of Viruses

A major problem that still needs to be solved is how the viruses maintain themselves during the nonepidemic season. One leading theory is that they are harbored in overwintering mosquitoes; another possibility is that they are maintained by latent infections in birds. There is considerable evidence that both these survival mechanisms are involved. For example, the WE virus has been isolated from naturally infected *C. tarsalis* collected in Kern County, Calif., in all months of the year except Decem-

ber (37), and it can survive through the winter in experimentally infected *C. tarsalis* (38). Also, this virus has been isolated from *C. tarsalis* in Colorado in December (39). In support of the avian theory are laboratory studies showing that birds may have a recurrent viremia and persisting organ infection for 1 to 10 months after infection with the WE virus (40). The hypothesis that migratory birds annually reintroduce encephalitis into this country has fallen into disrepute. Results of recent studies by Kissling and co-workers on the EE virus indicate the presence of stationary foci of infection (41).

Control

At present, prevention of encephalitis consists of two principal approaches, immunization and mosquito control. Vaccination is recommended as a prophylaxis for equines, but human immunization is not considered economically feasible; furthermore, suitable vaccines for human use are now not available.

Employment of measures to minimize vector mosquito production in areas where encephalitis may be endemic or epidemic appears to be the most practical approach to prevention. Present knowledge indicates that control efforts should be focused on *C. tarsalis*, *C. pipiens quinquefasciatus*, and *C. melanura*. An alternative possibility, which needs further study, would be the control of avian reservoirs of the viruses.

Epidemic Potential

Because of the lack of specific therapeutic treatment and lack of suitable human vaccines, coupled with the apparent widespread infection among birds and mosquitoes, the encephalitis viruses have a high epidemic potential. Hence, it behooves all public health workers to keep well informed on the epidemiology of this group of diseases and to maintain continuous vigilance. It is hoped that the intensive investigations now underway will provide a practical answer for adequate protection against the mosquito-borne encephalitis infections.

Summary

During the past 25 years, severe epidemics of western encephalitis (WE) and St. Louis

encephalitis (SLE) have occurred throughout western and central United States, but to date no major human outbreaks of eastern encephalitis (EE) have been recorded.

Because of grossly inaccurate and incomplete reporting, the actual incidence of "infectious encephalitis" is unknown, but this disease is being recognized as an increasingly serious health problem in the United States.

Information accumulated regarding the natural history of the WE, SLE, and EE viruses indicates that wild birds, particularly small species and nestlings, are the principal reservoirs of infection, and mosquitoes the vectors. The basic infection cycle normally is limited to birds and mosquitoes, with humans and horses as incidental entries.

Primary vectors of encephalitis include *Culex tarsalis* for both WE and rural SLE in the west and the *Culex pipiens* complex for urban SLE in central United States. Definite knowledge regarding the vectors of EE is lacking, but current evidence implicates *Culiseta melanura* for maintaining the basic infection chain in nature (bird-mosquito-bird) and possibly *Aedes*, *Psorophora*, and *Mansonia* mosquitoes for transmitting the disease to horses and humans.

Epidemics appear to be due to a fortuitous set of ecologic conditions, including high prevailing temperatures, heavy mosquito populations, and high rates of virus infections among nestling and adult birds.

The only known possible approach to the control of encephalitis in the United States is one of prevention, the employment of measures to minimize mosquito production in areas where encephalitis may be endemic or epidemic.

Owing to the constant and serious threat of encephalitis epidemics, it behooves all public health workers to keep well informed on the epidemiology of this group of diseases and to maintain continuous vigilance.

EDITOR'S NOTE: Mr. Beadle in this paper omits from western and eastern encephalitis the term "equine" on the ground that in the light of present knowledge this designation is misleading.

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Cancer Morbidity in the United States

IN 1938 the National Cancer Institute initiated a series of studies of morbidity from cancer which finally included 10 metropolitan areas scattered throughout the United States. Approximately a decade later, during 1948 and 1949, the study was repeated in the same areas.

Part I of this monograph, dealing with variations in the incidence of cancer by age, sex, race, geographic region, marital status, primary site, and histological type, was published in July 1955. This publication completes the analysis and combines the data contained in part I with that in part II. A discussion of intercity variation in cancer incidence has been added to part I. Part II compares the 10-city data with data from other sources and also deals with trends in cancer morbidity during the decade between the two surveys, the association of cancer incidence and income class, stage of disease at diagnosis, comparison of death certificates and case reports, and interpretation of the age curve of the incidence of cancer.

In 1947, out of every 100,000 residents of the 10 survey areas, 430 had cancer at some time during the year, in 319 cancer had been newly diagnosed, and 149 died of cancer. Compared with 1937, the prevalence rate was 26 percent higher, the incidence rate was 30 percent higher, and the mortality rate was 19 percent higher. Adjustment for the changed age composition of the population indicates a residual increase in reported illness from cancer of 10 percent for prevalence, 14 percent for incidence, and 3 percent for mortality.

The incidence of a number of specific forms of cancer is associated with socioeconomic status. The most consistent relationship observed is a relatively high rate of cancer incidence among members of the lower income classes. This type of association was clearly evident for the upper alimentary tract (lip,

mouth, pharynx, esophagus, and stomach), pancreas, respiratory system (larynx and lung), and cervix uteri. In contrast to findings for the upper alimentary tract, the incidence of cancers of the lower alimentary tract (large intestine and rectum) appears to be unrelated to income class. Similarly, in contrast to cancer of the cervix uteri, there appears to be no



The Public Health

MONOGRAPH

No. 56

The accompanying summary covers the principal findings presented in Public Health Monograph No. 56, published concurrently with this issue of Public Health Reports. The authors are with the National Cancer Institute, National Institutes of Health, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Health Service. Copies will be found also in the libraries of professional schools and of the major universities and in selected public libraries.

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Dorn, Harold F., and Cutler, Sidney J.: Morbidity from cancer in the United States. Public Health Monograph No. 56 (PHS Pub. No. 590). 207 pages. Illustrated. U. S. Government Printing Office, Washington, D. C., 1958. Price \$1.

association between income and the incidence of endometrial cancer.

Specific information on the stage of disease at diagnosis was available on 4 out of every 5 newly diagnosed cancer cases. Of those with a specified stage, 51 percent were reported to be localized at the site of origin, 27 percent with involvement of regional tissues, and 22 percent with remote or diffuse metastases.

In addition to the inherent metastatic potential of tumors, the accessibility of the organ of origin to direct examination is an important influence on the likelihood of discovering a neoplasm in an early stage of development. Sixty-two percent of cancers that originated in accessible sites were diagnosed while localized, compared with only 38 percent of cancers originating in inaccessible sites. However, when skin cancer, which generally does not spread to other organs, is excluded, the proportion of accessible cancer diagnosed while localized is reduced to 49 percent.

For a number of sites, the average age of patients diagnosed while the tumor was localized at the site of origin was definitely younger than the average age of patients who remained undiagnosed until after the extension

of the tumor to regional tissues or metastasis to remote organs. This was true for cancers of the ovary, uterus, and breast in women, and for cancers of the rectum in both sexes. It is possible that for these neoplasms the metastatic potential is greater in older than in younger women. However, it seems more likely that the difference in age between localized and metastatic tumors reflects the effect of delay in diagnosis. Thus, it appears that for cancers of the female reproductive system and the rectum the percentage of tumors diagnosed while localized is subject to improvement through screening programs, regular physical examinations, and increased alertness on the part of the layman and the physician.

In contrast to cancers of the aforementioned sites, patients with localized cancers of the stomach and lung tended to be older than those with regional or remote metastases. It is unknown whether rapidly metastasizing tumors of the stomach and lung tend to develop in younger people or whether the younger observed average age of patients with advanced neoplasms simply results from the fact that rapidly spreading tumors become symptomatic relatively soon after onset.

Public Health Service Traineeships

A total of 551 professional public health workers are attending school during the academic year 1958-59 on traineeships awarded by the Public Health Service under title I of the Health Amendments Act of 1956.

Public health nurses form the largest category receiving training, with sanitary engineers, health educators, and physicians next in order.

The list announced by the Division of General Health Services, Public Health Service, as of December 10, 1958, follows:

Nurses.....	245	Veterinarians.....	15
Sanitary engineers.....	62	Nutritionists.....	14
Health educators.....	48	Dentists.....	13
Physicians.....	45	Laboratory personnel.....	13
Sanitarians.....	39	Medical social workers.....	8
Others in sanitary field.....	16	Dental hygienists.....	5
Statisticians.....	16	Miscellaneous.....	12

publications

Proceedings of the National Conference on Hospital-Acquired Staphylococcal Disease. *PHS Publication (unnumbered)*; 1958; 213 pages.

Papers presented by the speakers and recommendations of the working delegates appear in these proceedings. Reviewing what is known about the infections, delineating areas that need additional investigation, and mapping plans for a practical attack on the problem, the publication provides extensive resource material.

The Summary Report of Discussion Groups in Section 2 is being reprinted. A limited number of copies of the proceedings and of the reprints of the discussion group summary are available from Chief, Technical Reports and Library; Communicable Disease Center, 50 Seventh Street, NE., Atlanta 23, Ga.

Health Statistics From the U. S. National Health Survey. Concepts and definitions in the health household-interview survey. *PHS Publication No. 584-A3*; 1958; 29 pages; 30 cents.

Emphasizing the structure of the household interview, the first section discusses the questionnaire, the interviewer and respondent, and time references in the interview.

Concepts of morbidity (including unrefined data, sifting criteria, and diagnostic information), disability, and medical and dental care are explored in separate sections.

Definitions comprise the largest section of the book. They relate to general morbidity, disability, persons injured and accidents, hospitalization, medical and dental care, location of residence, and demographic, social, and economic terms.

The Missouri: Water and Land Development for the Nation. *PHS Publication No. 604*; 1958; by the Missouri Basin Interagency Committee; 32 pages; 55 cents.

A description of the Missouri River Basin Water Resources Development Program, this booklet discusses why it is needed, tells what

is being built and how it is being done, illustrates the benefits, explains the cooperative operation, and outlines what needs to be done to complete the development plan.

The aim of the booklet is to provide a nontechnical explanation to the general public of this development activity, which covers one-sixth of the Nation's area.

An Electron Microscopic Study of the Early Stages of Dentinogenesis. *PHS Publication No. 613*; by Marie U. Nylen and David B. Scott; 1958; 55 pages; 45 cents.

Reporting one of the first embryological studies made at the electron microscopic level, this book should attract the attention of teachers as well as researchers.

Structural changes undergone by a group of cells during their differentiation, the subsequent alterations that accompany the assumption of their tissue-forming activities, and the collagenous fibrillar elements that are elaborated as a result of cellular function are depicted.

CO and You. Carbon monoxide poisoning. *PHS Publication No. 611 (Health Information Series No. 91)*; 1958; 8 pages; single copies 10 cents; \$5 per 100. Discusses symptoms and dangers, possible sources, and first aid. Designed for educational efforts in accident prevention.

Highlights of Progress in Research on Neurologic Disorders, 1957. *PHS Publication No. 597*; 1958; 16 pages; 15 cents.

Selected items on program developments and research studies conducted or supported by the National Institute of Neurological Diseases and Blindness, Public Health Service, during 1957 are compiled in four categories: basic research developments, collaborative and cooperative programs, advances in neurosurgery, and progress in individual disease categories.

Highlighted are advances relating to diagnosis of eye disorders, surgical treatment of temporal lobe epilepsy, biochemical findings pertaining to multiple sclerosis, cerebral palsy and parkinsonism, basic research relating to the regeneration of nerve tissue, improvement of a brain tumor detection device, and knowledge of the structure, function, and chemistry of the brain.

Selected References on Cardiovascular Disease. An annotated bibliography for nurses. *PHS Publication No. 472 (Public Health Bibliography Series No. 15)*; 1958; 72 pages; 30 cents.

A timesaving guide for nurses seeking information for their own and their patients' use, this completely revised bibliography supersedes the 1956 edition.

References are arranged in sections according to the main types of cardiovascular disease and to other major aspects such as public health and rehabilitation. A selection of films and other audiovisual aids is included. Annotations are designed to assist the nurse in gauging the usefulness of each listed item.

Insects That Carry Disease. *PHS Publication No. 594 (Health Information Series No. 90)*; 1958; 11 pages; single copies, 10 cents, \$5 per 100. Warns against houseflies, cockroaches, mosquitoes, fleas, and ticks as vectors of disease. Recommends measures for their control.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

ENDEMIC FLUOROSIS AND ITS RELATION TO DENTAL CARIES¹

By H. TRENDLEY DEAN, *Dental Surgeon, United States Public Health Service*

INTRODUCTION

The first thorough study of mottled enamel, that of Black (1) and McKay (2) at Colorado Springs and including the Pike's Peak watershed, reported as early as 1916 that, in regard to caries, the teeth of these Colorado children com-

munities where endemic I wrote of the difficulty of teeth and stated that, though in non-endemic areas teeth are eventually lost because of the hypoplastic tooth structure.

Workers in other countries have reported various aspects of this phenomenon. In the western part of the Japanese archipelago, endemic areas in the Prefecture of Shima, and Aichi, 12 of the 47 prefectures. In an English abstract of the literature that "It is also remarkable that the number of observations is comparatively small among the number of observations is not stated in the abstract."

Ainsworth has commented on the prevalence of caries among children in the town of Bridge, Essex County, England. The Committee for the Investigation of the Dental Research Council, this year examined 4,000 children in the public

RELATION BETWEEN THE AMOUNT OF DENTAL CARIES (PERMANENT TEETH) OBSERVED IN 7257 SELECTED 12-14 YEAR OLD WHITE SCHOOL CHILDREN OF 21 CITIES OF 4 STATES AND THE FLUORIDE (F) CONTENT OF PUBLIC WATER SUPPLY

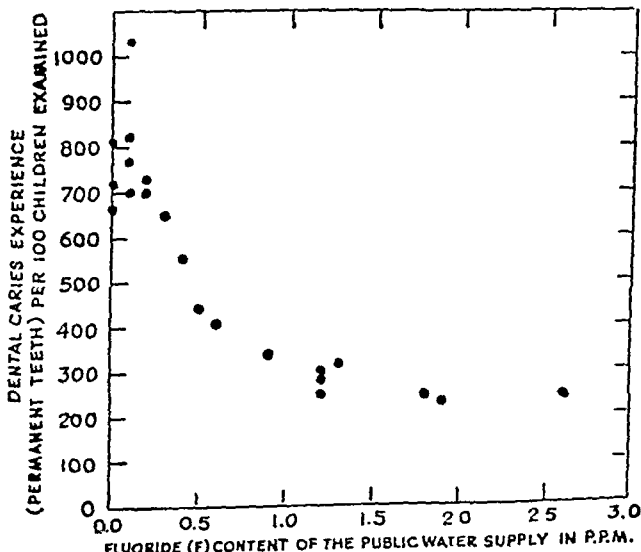


FIGURE 2

AUGUST 19, 1938, pp. 1443-1452

After verifying the relationship between the natural occurrence of fluorides in drinking water and the reduction in dental caries, Dr. H. Trendley Dean concluded that the "possibility of controlling dental caries through the domestic water supply warrants thorough epidemiological-chemical study." Figure 2 in an article that followed (August 7, 1942, pp. 1155-1179) provides the basis for present-day fluoridation.

Poliomyelitis Vaccination

SURGEON GENERAL LEROY E. BURNEY

IN 1958 there was more paralytic poliomyelitis in the United States than in 1957. The rates for paralytic cases were highest in 1-year-olds, and more than half of all paralytic cases occurred in children under 5 years of age.

Despite the high susceptibility of the Nation's preschool children, about a third have had no poliomyelitis vaccine. The total unvaccinated population under 40 years of age, including children and young adults, is more than 40 million.

These salient facts about the progress of vaccination against poliomyelitis were the subjects of a daylong discussion in Washington, D. C., in early December 1958. The meeting was called by the Public Health Service and was attended by representative State and city health officers and health educators and officials of the American Medical Association, the American Academy of Pediatrics, the Association of State and Territorial Health Officers, the National Conference of State Health Educators, the National Health Council, the National Foundation, the Advertising Council, Inc., and the Pharmaceutical Manufacturers Association.

The group agreed that the story of the Salk vaccine during the past 3 years is a truly remarkable one. More than 50 million persons have been vaccinated, and the incidence of poliomyelitis has dropped gratifyingly. Seldom, if ever, in the history of public health have so many persons taken advantage so quickly of a major preventive health measure. Seldom has there been a greater mobilization of health and medical resources, or a more intensive and sustained effort by official and voluntary organizations to accomplish a health purpose.

We have at hand a highly effective vaccine.

The 1958 poliomyelitis experience, to be described in the Communicable Disease Center's 1958 Poliomyelitis Surveillance Report, has provided additional evidence to support this statement.

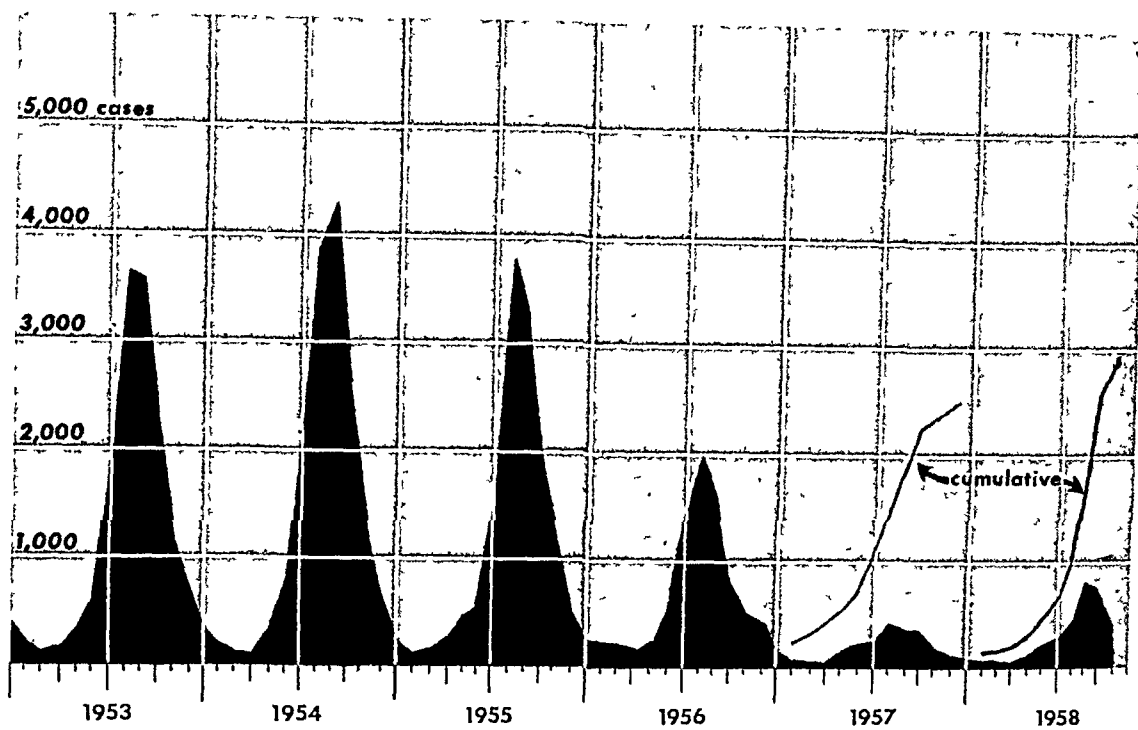
Yet the task remains to carry further the work of immunization. Although the Salk vaccine is not a 100 percent preventive and although the available data suggest that poliovirus continues to circulate even in well-vaccinated communities, it is evident that much of the paralytic poliomyelitis that occurred in 1958 could have been prevented if more persons had been vaccinated. It is equally clear that, by pushing forward with vaccination programs now, much can be done to reduce the number of paralytic cases that will otherwise occur in 1959 and subsequent years.

To translate what we know about a problem into effective action to solve it is, of course, one of the principal and never-ending challenges of society. Every health administrator is aware of the twin needs: to dispel ignorance and to overcome apathy.

Why have vaccinations lagged in the past 6 months? What means can be used to stimulate more people to seek vaccinations? These two questions were the chief subjects discussed at the Washington meeting.

The participants agreed that the primary responsibility for reaching the unvaccinated remains, as it always has, with the local community. Much has been done that can contribute to the accomplishment of the remaining task. The public is now widely informed about the vaccine, and professional people have gained valuable experience. These advantages, however, only partially offset the fact that the

Monthly Paralytic Poliomyelitis Incidence, 1953-1958



people who now remain unvaccinated are largely those who are difficult to reach with any health program. To get them vaccinated will require "face to face" campaigns under the leadership of local groups.

Surveys have demonstrated that many of the unvaccinated are in the lower socioeconomic groups. Reports from three of the 1958 epidemic areas stress this point. It is borne out, as well, by a sample survey conducted in Atlanta by the Public Health Service's Communicable Disease Center. It would be a mistake, however, to attribute the lag solely to economic reasons. Many communities, through local medical societies or public agencies, have offered vaccine free or at minimal cost during these past 3 years and found too few takers. Such factors as educational status, accessibility of clinics, simple fear of the needle, the human fault of procrastination, and, of course, indifference and apathy—all have a bearing. These and other problems are discussed in a paper by Rosenstock, Derryberry, and Carriger in this issue of *Public Health Reports*, pp. 98-103.

Undoubtedly the relative importance of the factors that interfere with acceptance of poliomyelitis vaccination varies from community to community. It is therefore important for each community to determine for itself what its chief problems are and how they relate to the current vaccination status in the various geographic sections of the city, such as census tracts or school districts. The resulting information then needs to be used to tailor the community's vaccination program to fit the local situation.

Professional health workers need not be reminded of how the process of acquiring this information can be used to enlist the active participation of physicians, agencies, and organizations in the vaccination program. It has been demonstrated many times that such groups work much more effectively throughout a program if they are consulted and utilized in the factfinding stage. By this device they are made to feel keenly their responsibility to do something about the findings that their studies reveal.

At the Washington meeting, the Public

Health Service announced that it was willing to help in this aspect of local community drives by lending to communities some of the technicians who carried out the Atlanta survey. I am glad to repeat that offer here.

The emphasis on local community responsibility is also explicitly set forth in recommendations unanimously adopted by the House of Delegates of the American Medical Association at the annual meeting on December 4, 1958. A happy coincidence of dates enabled us to provide the representatives at our meeting with a copy of the AMA resolution.

In brief, the recommendations are that (a) each physician assume responsibility for making sure that all members of the families he sees are fully vaccinated; (b) that State medical societies work with State health departments to bring county medical societies together with health departments to work out vaccination programs; and (c) that county medical societies meet with local health departments to survey local problems and devise ways to meet local situations.

In discussing the role of the local community with respect to poliomyelitis vaccination activities, I do not mean to suggest that the Public Health Service will not continue its efforts. We shall, of course, continue our surveillance and reference diagnostic services and continue to

offer assistance when epidemics threaten. In promoting vaccinations, we shall continue to conduct a program of public information and education through the States and in cooperation with national organizations.

We have asked again and have been assured of the assistance of the Advertising Council in a national campaign, to begin in the spring, of newspaper, radio, and television reminders of the importance of poliomyelitis vaccinations.

All the national organizations represented at our meeting have indicated that they will continue their national programs and will urge their State and local affiliates to do all within their power to make community drives a success. The National Health Council has also offered its assistance in working with other national organizations.

The new element introduced at the Washington meeting, in other words, was not a shift in the relative responsibility assumed by national, State, and local organizations but rather a shift in the way these efforts would be channeled. Until now, programs have been aimed principally at the general public. It is proposed now that in addition we seek to pinpoint our targets, finding as precisely as possible what segments of the population in each community have not been reached, and devising programs to meet their special needs.

Zero Tolerance for Aramite Established

The Food and Drug Administration has ruled that no residue of the pesticide Aramite is permissible on fruit and vegetables in interstate commerce. The new order, effective December 24, 1958, rescinds the previously established tolerance of 1 ppm.

The action was based on data from animal feeding studies, submitted by the manufacturer, which show that Aramite when fed at levels as low as 500 ppm causes cancer in dogs.

At the request of the manufacturer, and as provided by law, an advisory committee of scientists was nominated by the National Academy of Sciences and appointed by the Food and Drug Administration to consider the data from the feeding studies. The committee recommended the zero tolerance for Aramite.

Analysis of research on the social and psychological factors which influence people to accept or reject poliomyelitis vaccination suggests that people who are currently incompletely vaccinated can best be reached through personal, face-to-face contacts.

Why People Fail to Seek Poliomyelitis Vaccination

IRWIN M. ROSENSTOCK, Ph.D., MAYHEW DERRYBERRY, Ph.D.,
and BARBARA K. CARRIGER, B.A.

EPIDEMIOLOGICAL investigations of the 1958 outbreaks of poliomyelitis add to the growing body of evidence that Salk vaccine is safe and effective in preventing the disease. The major proportion of cases, particularly the paralytic, are occurring among incompletely vaccinated individuals. Thus the prevention of such epidemics as occurred in 1958 will not devolve primarily upon technical development of preventives. Rather, prevention will require increasing the number of people who protect themselves and their families through vaccination. Public health workers desiring to bring about such action can be more effective if they know why people fail to accept poliomyelitis vaccination, their motivations in rejecting or accepting it, the conditions under which they will respond to appeals for action, and the communication channels through which they get health information.

To provide such information quickly, the Public Health Service, through the regional office organization, recently asked States and

universities to supply information obtained from systematic studies which would help to identify (in terms of age, education, income, and other factors) segments of the population that have been hard to reach for vaccination, and which would help to explain why people accept or fail to accept poliomyelitis vaccinations.

In addition to the formal inquiry, the literature on these topics was searched independently.

Although little time was available for gathering data in preparation for a national meeting to consider the problem, more than 40 research activities on poliomyelitis vaccination were identified. Seventeen of these were found to bear directly on the question of why people accept or fail to accept vaccination for themselves and their families. Of the 17 studies, 13 were reviewed; 4 were unavailable. Seven of the 13 were discarded because of methodological limitations in their design or because they could not be properly evaluated.

The six remaining studies (1-6) are methodologically sound and report findings which have implications for planning poliomyelitis vaccination programs. These studies contribute to our understanding of why people accept or reject vaccination. However, except for the Clausen (2) and Deasy (3) reports, which rep-

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resent different analyses of the same data, the studies were independently done, so that the relationships among the findings are not always clear. We shall attempt, therefore, to crystallize these relationships by analyzing the findings according to one set of explanatory concepts. The interpretations presented here, however, are not fully supported by adequate data in all cases. Additional studies of the explanatory concepts will be required to assess the validity of our interpretations.

From an analysis of the six studies, it would appear that two broad classes of factors determine the decision to participate in vaccination programs. These are personal readiness factors and social and situational factors.

Personal Readiness Factors

The factors of personal readiness include the motives, attitudes, and beliefs of individuals which affect their willingness to take voluntary action with regard to their health. Hochbaum (7) has described the importance of these factors in guiding the decision to obtain chest X-rays. In connection with poliomyelitis vaccination, three components of a person's readiness to seek vaccination can be identified: the extent to which he believes he may be susceptible to the disease, the seriousness with which he regards the consequences of getting the disease, and his conception of the safety and effectiveness of the vaccine.

Perceived Susceptibility

It would appear that a basic determinant of the decision to seek vaccination is the extent to which the individual believes that he is susceptible to poliomyelitis, or, for children, the extent to which the parent believes that his child is susceptible.

In Glasser's report of the study made for the National Foundation for Infantile Paralysis (4), the absence of perceived susceptibility is cited as 1 of the 2 principal barriers to the decision to obtain vaccination. Merrill and his associates (5) show that poliomyelitis tends to be regarded as a disease affecting only children, which may account for the failure of some adults to accept vaccination. The authors suggest that the establishment of vaccination

priority groups tended to reinforce this perception among leading people that those included in the first priority group were the only ones who needed vaccination. The familiar picture of the child on crutches may also have reinforced the belief that poliomyelitis is a disease of children.

The failure to believe that one is susceptible to poliomyelitis may be a widespread problem. In the National Foundation for Infantile Paralysis study (8), 72 percent of the young adult sample believed that poliomyelitis had been nearly brought under control.

It must be stressed that this variable, perceived susceptibility, refers to the beliefs of people and not to objective facts about incidence. It is known that behavior is determined more by one's beliefs about reality than by reality itself, and that people vary markedly in their interpretations of reality.

Perceived Seriousness

Even when an individual feels he is susceptible to poliomyelitis (or believes that his child is), he will not act on his feeling unless he also believes that his becoming ill would have serious repercussions on his life. Here again it is the belief rather than the reality which is the important determinant of the decision.

While the data on seriousness are not as clear-cut as those on susceptibility, the studies by the National Foundation for Infantile Paralysis and Merrill and his co-workers suggest the importance of this factor in determining one's decision concerning vaccination. In the former study, it is shown that twice as many men as women in a nationwide sample believed that poliomyelitis in adults is milder than in children, and half as many men in the sample had been vaccinated. The latter study shows that the over-40 age group may not see poliomyelitis as constituting a serious problem for adults, and additional data suggest that poliomyelitis is considered to be milder in adults than in children.

Safety and Effectiveness

One's decision to accept vaccination for one's self and one's family is a function not only of the perceived likelihood of contracting the disease and the perceived seriousness of the disease

should it occur, but it is also a function of the kinds of beliefs one has about the safety and effectiveness of vaccination in reducing susceptibility and seriousness.

However concerned one is with poliomyelitis, if he thinks the vaccine is unsafe or ineffective, he will not accept vaccination. In the three studies reviewed which were conducted in connection with the field trials of 1954, questions of safety and effectiveness are frequently mentioned as a factor limiting decisions to participate (2,3,6). However, in Glasser's 1957 study (the most recent of the several reviewed), it is shown that such fears have largely been dispelled and no longer seem to be an important factor limiting acceptance of vaccination. It is certainly possible, however, that in specific groups this factor may still be important.

The three variables, perceived susceptibility, perceived seriousness, and beliefs about vaccination, define the kinds of personal factors that influence a decision relative to vaccination. But there is reason to believe (although the authors of the studies reviewed do not discuss this point) that the decision is determined not only by the kind of beliefs one has but by other factors as well.

Again and again the studies reviewed list procrastination, forgetfulness, neglect, apathy, carelessness, and laziness among the factors influencing the decision to vaccinate. These terms are not useful since they neither define a dynamic process nor suggest ways of overcoming the problem. We believe that these terms may be synonyms for one of two kinds of processes.

Clausen (9) reports data from California which suggest that there is a social class influence on behavior which is somewhat independent of the three beliefs described above. He shows that even among mothers who are generally favorable to vaccination those with much education and married to white collar workers were much more likely to have their children vaccinated than those with little education and married to blue collar workers. The extent to which such a social class influence operates independently of the kinds of beliefs described above must await detailed study of that question.

It is also possible that "procrastination,"

"apathy," "laziness," and the like reflect insufficient amounts of readiness to obtain poliomyelitis vaccinations.

It has been noticed that a great many people appear to have minimal motivation with regard to poliomyelitis. Glasser, for example, reports that by and large "people were failing to take advantage of the vaccine for themselves and their children, not because of specific resistance to it, but rather because of lack of definite, positive influences which might direct them to a clinic or doctor's office for inoculations" (4).

Limited data suggest that many people may already share the necessary beliefs, but not in sufficient degree. It is likely that those people with more than minimal motivation have already been vaccinated.

Social and Situational Factors

The personal readiness factors influence the voluntary decision to seek vaccination. However, the studies reviewed suggest as well that a variety of situational and social conditions may be effective in stimulating people to seek vaccination even in the absence of appropriate kinds and degrees of personal readiness.

Two components of the social and situational factors may be identified: social pressure and convenience.

Social Pressure

Clausen, Deasy, Glasser, and Merrill (2-5) all observe that vaccinated persons are more likely than unvaccinated persons to report discussion of vaccination with friends, in groups such as the PTA, or with physicians. Despite certain difficulties in interpreting this finding, it has at least been demonstrated that considerably more communication and interaction occurs among people who have taken action than among those who have not.

The individual's decision to seek vaccination may be determined by the social pressures applied by persons who are important to him. Belcher (1) shows that a greater proportion of Negroes than whites participated in a vaccination program in two Georgia communities. He suggests the importance of the fact that Negro school teachers urged the program among their pupils as enthusiastically as they could. There

is even a hint that the activities of some may have bordered on coercion. Negro ministers, both on and off the pulpit, urged vaccination. Public health physicians and nurses, presumed to be of fairly high status in the Negro community, also urged the people to seek vaccination.

Data presented by Glasser suggest that the physician will have a highly important role in stimulating people to be vaccinated. More than 90 percent of his adult sample looked to the physician as the principal source of information on poliomyelitis. Moreover, an overwhelming majority of unvaccinated persons reported that they would seek vaccination if their physician recommended it, and 80 to 90 percent of this group reported having a regular physician.

Convenience

Included within the notion of convenience is the distance one has to travel to obtain vaccination, the hours at which it is available, the cost of vaccination, and the acceptability of the facilities in which vaccination is performed. For any individual with a given degree of readiness to be vaccinated, the ultimate decision will be facilitated the more convenient, simple, and inexpensive the action is.

In explaining the higher participation rate of Negroes than of whites in the communities he studied, Belcher suggests the importance of the fact that vaccinations were administered at and by the local health department, a facility more widely known and accepted among Negroes than whites, that vaccination was free, and that more school buses were provided to take Negro children to the clinic for vaccination than to take white children.

Readiness and social factors may operate with a degree of independence of each other or they may interact. However, when the personal readiness to seek vaccination is weak, we would not expect the individual to act unless the social and situational forces impinging on him were strong. On the other hand, when relevant social factors are weak or absent, vaccinations would be sought only by persons with considerable personal readiness.

The evidence to date suggests that, among the currently unvaccinated, personal readiness to

obtain poliomyelitis vaccination is so weak that rather strong social supports may be needed to modify their behavior in the short run. Educating for increased personal readiness can probably be effective only in the long run.

Obviously, the use of social forces in urging poliomyelitis vaccination entails working with local groups, often in face-to-face contacts. Deasy, Glasser, and Merrill have made this point explicitly, and Belcher has made it implicitly.

Each of the studies reviewed uncovered ignorance or misinformation among the people interviewed, and especially among those who have not been vaccinated. Clausen, Deasy, Glasser, Merrill, and Weiss show that acceptance of poliomyelitis vaccination is closely related to socioeconomic status, primarily education and occupation or income. The majority of the studies reviewed here offer evidence that the groups hardest to reach (the poorly educated and the nonwhite) will have to be approached personally rather than through mass means of communication. This conclusion is supported by research on communications performed on other subjects.

In the following paragraphs, only a few communication studies will be mentioned, although the bibliography is extensive. The role of television can only be referred to; standard books on communications research do not yet include much on the new medium.

Communications Research

It is known that different groups are differently exposed even to the most ubiquitous media. Lazarsfeld and Kendall (10) have shown that the lower educational groups do not read newspapers, magazines, and books to the same extent as do groups with more education; they differ little in exposure to movies and radio. However, even when groups are exposed to the same medium, they may attend to and learn different things from the same material.

Schramm and White (11) showed that with respect to newspaper reading, lower educational groups tended to read news of crime, corruption, disaster, and sports, whereas the more educated tended to read news of public affairs, economics, science, and social affairs.

Moreover, in a study performed for the National Association of Science Writers (12), it was clearly shown that the extent to which one could recall having learned any science or health information from newspapers, magazines, television, or radio was closely related to amount of education. Thus, of a group with less than high school education, more than one-third could recall no health or science information from these media, whereas of the group with high school education, only 11 percent were similarly unable to recall science or health information. At the higher educational levels, virtually everyone was able to recall science and health information from these sources.

Some of the data reported in the poliomyelitis studies support this trend. Belcher found that the nonwhites in his sample obtained their information on poliomyelitis and vaccination from personal sources (teachers, children, public health officials), while whites tended to get their information through impersonal sources. Similarly, Deasy showed that while all women in her sample had been exposed to an identical brochure, which had been brought home by their children, on the 1954 field trials, and while practically all women in the sample had been exposed to daily papers which were featuring intensive coverage of the field trials, the women differed in knowledge and acceptance of the program, acceptance being associated with amount of education.

Katz and Lazarsfeld (13) report that people who are reached by educational programs through the mass media are very largely those who do not need the education. Those who do need the education tend to stay away. In their words, "Those groups which are most hopefully regarded as the target of the communication are often least likely to be in the audience. Thus, educational programs . . . are very unlikely to reach the uneducated; and goodwill programs are least likely to reach those who are prejudiced against another group" (13a).

It is not to be denied that the mass media have, and always have had, an important role in communication. However, the poliomyelitis and communication studies reviewed here suggest that the assets and liabilities of the traditional approach should be considered in the

light of the particular needs that face us in attempting to reach the lower income family, the family with little formal education, and the nonwhite family.

In this context, Merrill and his co-workers, in discussing people who have little money and little formal education, have said, "It appears that there is need for a change in target and methods if we are to reach this group effectively with health education" (5).

In a similar vein, Glasser states, "Informal communication—getting people to talk about vaccination—would appear to be the most direct method of accelerating the vaccination program" (4).

Summary

A person's beliefs about his susceptibility to poliomyelitis, about the severity of the disease, and about vaccination comprise the major components of his readiness to take action. On the other hand, social forces, including factors of pressure and convenience, are important in guiding the decision to be vaccinated or not.

The data reported tend to suggest that social class membership may affect decisions to be vaccinated and that personal readiness for poliomyelitis vaccination may be weak in those who are currently incompletely vaccinated. If this is so, the social factors would have to be stressed in order to insure more widespread acceptance of vaccination.

In considering the approaches that may be made to reach groups in an attempt to stimulate greater acceptance of vaccination, one is struck with certain serious limitations of the traditional approach of mass media of communication. It would appear that personal contacts with members of the so-called hard-to-reach groups may be required to stimulate increased acceptance of poliomyelitis vaccination.

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film

Use of Anticoagulants in Rodent Control

35-mm. filmstrip, color, sound, 9½ minutes, 76 frames. 1958.

Audience: Federal, State, local, and other health personnel engaged in rodent control.

Providing a comprehensive description of how anticoagulants are employed to kill rodents, this filmstrip shows the advantages of these poisons compared with other poisons. It lists the forms and types of anticoagulants available. It describes the various baits and tells how to prepare them, shows the



containers and how to place the poisons to get the most efficient kill. Precautionary measures to be used in handling these materials are emphasized.

This film may be obtained on LOAN from the Communicable Disease Center, Public Health Service, 50 7th Street NE., Atlanta 5, Ga., or by PURCHASE from United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

Legal note . . . Liability for Air Pollution

Res ipsa loquitur doctrine held applicable in suit for damages resulting from fluoride poisoning allegedly caused by defendant's aluminum reduction plant; defendant's evidence of reasonable care held insufficient to require finding as a matter of law that inference of negligence had been overcome. *Reynolds Metals Company v. Yturbide*, 258 F. 2d 321 (9th Cir., June 5, 1958).

The plaintiffs claimed they were poisoned by fluorides originating from the plant of the defendant, the Reynolds Metals Company. Their injuries were found by a jury to have been caused by excessive emission of fluorides by the defendant's plant. On appeal by the defendant the court of appeals, sustaining the verdict for plaintiffs, held that the defendant's evidence of reasonable care in operation of the plant was not sufficient to rebut the presumption that the excessive emission of fluorides was attributable to defendant's negligence.

The defendant operated an aluminum reduction plant in Troutdale, Oreg. In December 1946, shortly after operations began, the plaintiffs moved to a farm about 1 mile from the plant. For a period of about 4 years, a daily average of 2,800 pounds of fluoride was discharged into the atmosphere from the plant, running as high as 3,900 pounds daily in 1 month. In November 1950, when an improved system was installed, the fluoride discharge was reduced to a daily average of 643 pounds.

Although there was no proof of the quantities of fluorides which reached the plaintiffs' land, the court found that the fluorides emitted by defendant's plant were toxic, and it was conceded by the defendant that the fluorides escaping from its plant were poisonous in excessive amounts. The plaintiffs showed that the fluoride effluent reached their property and settled on it, that it was absorbed by vegetables, which were eaten by plaintiffs, that it etched the glass in their home, and that it was presumably inhaled by them. Evidence was also adduced that the plaintiffs' health improved when they moved away from the vicinity of the plant.

The defendant contended that (a) the proof was insufficient to demonstrate that the plaintiffs' injuries were caused by fluorides escaping from the plant and (b) there was no evidence of negligence or breach of duty by the defendant.

With respect to the first contention, the court held that on the basis of the evidence presented the

jury was warranted in finding that the plaintiffs' injuries were caused by the fluorides emitted by the defendant's plant which found their way to the plaintiffs' property. Although evidence was presented by the defendant to show that only a small concentration of fluorides could have reached the plaintiffs, the court ruled that the fact that they suffered fluoride poisoning supported the finding that an "excessive amount" of fluoride, sufficient to cause such poisoning, was cast upon the plaintiffs' property from the defendant's plant.

The plaintiff was unable, however, to specify any particular acts of negligence by the defendant which brought about the injury and was compelled to rely on the legal doctrine of "*res ipsa loquitur*" (the thing speaks for itself) under which the facts of the occurrence warrant the inference of negligence.

Since the defendant's evidence was to the effect that, despite the large amounts of fluorides it admitted escaped into the air, no significant concentrations of fluorides were produced in localities near the plant, the trial court charged the jury that it was not to be expected that in the ordinary course of events the fluorides emitted by the plant would cause injury in the absence of negligence of the defendant. The court of appeals held that a finding that excessive amounts of fluorides were deposited on plaintiffs' property (a permissible inference from the facts) from the plant whose construction, operation, and maintenance was under the exclusive control of the defendant could reasonably be accepted as circumstantial evidence of negligence.

The court rejected the defendant's argument that this holding resulted in the application of a rule of absolute liability. Although the defendant's evidence tended to show that reasonable care had been exercised to control the amount of fluorides emitted by its plant, the court pointed out that such evidence did not preclude the jury from rejecting the defendant's version of the facts nor from finding that the defendant was in fact negligent.

New laboratory procedures are used for evaluating critical dosage, bait refusal, and speed and variability of action of five poisons against three rodent species. Warfarin is not excelled by other compounds tested, but some others are about equal to it against some species.

Laboratory Studies of Five Anticoagulant Rodenticides

WAYLAND J. HAYES, Jr., M.D., Ph.D., and THOMAS B. GAINES, B.S.

EARLIER studies on warfarin have emphasized the difference between the newer, anticoagulant rodenticides and the older, quick-acting poisons (1). It was evident at the beginning that laboratory tests used for quick-acting rodenticides were not applicable to the newer poisons without modification. Hence, development of a suitable laboratory method for rapid evaluation of the slow-acting rodenticides was an important part of the present studies. The procedures devised, as well as the results obtained with respect to required dosage, bait refusal, and speed and variability of action, are reported in detail.

Materials and Methods

All wild rodents tested were caught by hand in the field and then held in the laboratory on a diet of laboratory chow (A) for a minimum of 2 weeks before testing. During each test, the rodents were kept separately in cages of the Army Medical School type. They were offered free choice of (a) unpoisoned, ground labora-

tory chow and (b) yellow cornmeal (maize) containing an appropriate concentration of the rodenticide under test. Water was available at all times. Yellow cornmeal was chosen as the food in which to offer the poison because it has proved to be the most generally acceptable, inexpensive bait under field conditions. Laboratory chow was used as the poison-free food because it was the food to which the rodents were conditioned before the tests began and because it is as similar as is practically possible to the mixed diet which rodents receive in nature. Providing the two foods simulates field conditions, as it is generally impractical under field conditions to offer poison to rodents in the same kind of food as that to which they are accustomed. In fact, an effort should be made to offer a bait which the animals will prefer to their ordinary food.

Figure 1, part a, shows cups for offering a choice of food in place at the back of a cage. These cups, with special lids to minimize spillage, are available commercially. They are satisfactory, but experience has shown that wild rats overturn them occasionally. Spring clips were designed to hold the cups firmly in place (fig. 1, parts b and c). These clips, made without special tools from 24-gauge galvanized sheet metal, can be bolted to the back of each cage. The food cups can be easily removed

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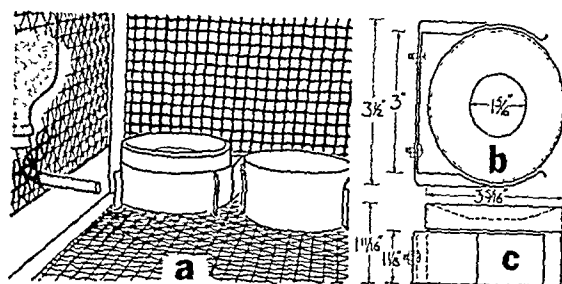
from the clips for weighing, but rodents cannot move them.

These cups, the smallest commonly available from dealers, are too large to use with mice since strong animals frequently get into them, while mice weakened by poison cannot reach the food at all and are thus starved. Cups made from 2-ounce ointment cans proved satisfactory for mice. A hole seven-eighths of an inch in diameter was cut in the center of the metal lid, and the top portion of the lid was then depressed in a conical form similar to that of the larger, commercial models shown in the figure. Special holders for the small cups were not necessary even for wild mice. A disk of $\frac{1}{4}$ -inch mesh hardware cloth was put in each cup to prevent mice from scratching food out. As an added precaution, fresh paper was used in the tray of each cage so that any spilled bait could be detected.

The following rodenticides were studied: warfarin, 3-(d-acetonylbenzyl)-4-hydroxycoumarin; coumachlor, 3-(d-acetonyl-4-chlorobenzyl)-4-hydroxycoumarin; Pival, 2-pivalyl-1,3-indandione; PMP, calcium salt of 2-isovaleryl-1,3-indandione; and Diphacinone, 2-diphenylacetyl-1,3-indandione (*B-F*). Each compound was tested against adults of one or more of the following species: the Norway rat, *Rattus norvegicus*; the roof rat, *Rattus rattus*; and the house mouse, *Mus musculus*. A short supply of animals prevented testing coumachlor against mice or Diphacinone against roof rats or mice.

The dry, poisoned baits were prepared by mixing appropriate amounts of the rodenticide into the bait with an ordinary kitchen-type electric food mixer. For low concentrations of poison (50 ppm or less), the technical grade compound was weighed out carefully on an analytical balance and then, with a mortar and pestle, thoroughly mixed with cornstarch in the proportion of 1 part rodenticide to 99 parts cornstarch by weight. The amount of this rodenticide-cornstarch concentrate required to give the desired concentration of poison in a selected weight of finished bait was weighed out and mixed thoroughly with about one-fourth the necessary weight of cornmeal. The remainder of the cornmeal was then added and mixed to give the final concentration of poison

Figure 1. Equipment for offering a choice of baits to caged rodents.



Part a, food cups held in place by metal clips (cover of one cup removed). Part b, top view of metal clip and food cup. Part c, end view of same clip with food cup in place.

to be tested. For the higher concentrations of rodenticide (100 ppm or more), the procedure was the same except that the proportion was 1 part rodenticide to 19 parts cornstarch. Each separate mixing with the cornmeal required at least 15 to 20 minutes. Coarse, degerminated cornmeal of a quality suitable for cooking was used in all the tests.

Each rodenticide was tested in several of the following concentrations, which form a geometric progression with a factor of one-half: 800, 400, 200, 100, 50, 25, 12.5, 6.3, 3.1, and 1.5 ppm. Chemical analyses showed that it was possible to obtain these concentrations with an error of 0.5 ppm or less. Ten rodents (5 males and 5 females, when possible) were usually used for each test; more than one test was frequently made, especially at the lower dietary concentrations. Each rodent was offered the poison (as well as poison-free food) for a maximum of 40 days. Surviving animals were maintained on laboratory chow until they died or until their survival was assured. The time of death was recorded in all instances.

During the tests, the intake of poisoned bait and of poison-free food was recorded daily for each animal. The animals were weighed once a week. These measurements made possible the calculation, on a milligram per kilogram basis, of the total dosage of rodenticide ingested by each rodent. They also made possible direct comparison of the amount of poisoned bait and of poison-free food taken by each rodent. Bait refusal is conveniently expressed as the average percentage of the total daily

diet during the exposure period which was poison free. As already mentioned, this percentage was intentionally suppressed by offering the poison in an attractive bait. However, the choice of diet used in the test permits rodents to refuse poison completely (bait refusal=100 percent) without undergoing any hunger.

Under practical conditions of use, it is characteristic of poisoning by anticoagulant rodenticides that most of the animals die relatively soon after the first one, but a few linger on for many days especially when the poison is fed at a low concentration. (The initial delay is explained by the pharmacological action of these compounds.) Values skewed in this way tend to be normalized by logarithmic transformation. Therefore, the logarithms of the survival times were used to calculate the geometric mean and 95 percent confidence limits. The antilogarithms of the resulting values were then plotted (together with the observed values) against the concentration of rodenticide in the bait. In all instances, the calculations were based solely on animals which died. However, in those instances in which one or more animals survived the test, the upper 95 percent confidence limit was not plotted because in this situation it is not realistic.

The critical dosage is defined as the smallest average dosage killing a species so rapidly that the upper 95 percent confidence limit for that and all higher average dosages is 45 days or less. (Usually, the critical dosage was identical to the smallest average dosage which killed all rodents tested.) The dietary level of poison consumed by those rodents which received the critical dosage is designated the critical concentration.

The average bait refusal of rodents offered four times the critical concentration is selected as the value for comparison of one species with another and of one poison with another. The factor of 4 is used so that comparisons may be made for dietary levels suitable for field use. It has been observed, within the geometric progressions of dosages studied, that a factor of 4 compensates adequately for irregularity in consumption of bait and other ill-defined variables which characterize the use of rodenticides in the field. Thus, a factor of 2 is too small,

and a factor of 8 is unnecessarily large. For the same reason, the geometric mean for time-to-kill (in days) for rodents offered four times the critical concentration is selected as a comparative value for the speed of action.

The variability of action is defined as the difference (in days) between the geometric mean and the upper 95 percent confidence limit of the time-to-kill for rats fed four times the critical concentration. This method of expressing variability of response gives practical information about the period necessary to kill a species with a particular poison. The variabilities of dosage and bait refusal tend to be correlated; however, they are of less practical interest and are not presented in this paper.

Results

The results in regard to dosage are presented for all compounds and all species tested in table 1. Corresponding results on bait refusal and speed of action are given in figure 2. Some indication of the variability of action of each poison also may be inferred from the figure.

The data in table 1 indicate that the critical dosage is truly characteristic of the action of a particular poison in a particular species. For example, the critical dosage of warfarin for wild Norway rats was 4.2 mg./kg., corresponding to a concentration of poison of 12.5 ppm; yet even over the wide range of concentration of poison of 1.5 to 50 ppm the average dosage showed the narrow range of 2.3 to 6.8 mg./kg. The critical dosage of warfarin for the roof rat was 18.1 mg./kg., a value distinctly different from that for the Norway rat.

The dosage of any of the rodenticides tested necessary to kill the three common commensal rodents is small; however, as shown in table 1 and in figure 2, the three species differ strikingly in their response to the rodenticides. In general, the Norway rat was most susceptible, as judged by dosage and survival time, and the roof rat was least susceptible. Furthermore, the roof rat tended to show greater variability of response than the Norway rat. The house mouse resembled the Norway rat in susceptibility but the roof rat in variability. Thus, the results determined for one species cannot be applied with precision to another.

Table 1. Dosage of anticoagulant rodenticides consumed by rodents when offered

Species and concentration of poison in bait (ppm)	Warfarin				Coumachlor			
	Total dosage		Number of animals tested	Percent mortality	Total dosage		Number of animals tested	Percent mortality
	Range (mg./kg.)	Mean (mg./kg.)			Range (mg./kg.)	Mean (mg./kg.)		
<i>Wild Norway rat</i>								
800-----	6.8- 173.2	96.7	10	100				
400-----	7.8- 88.0	37.4	10	100				
200-----	1.3- 51.3	28.8	20	100				
100-----	11.8- 21.0	15.7	10	100				
50-----	1.0- 11.5	6.8	10	100	3.7- 12.8	9.0	10	100
25-----	2.4- 5.9	4.7	10	100				
12.5-----	2.5- 10.9	4.2	10	100	2.9- 14.9	5.9	10	90
6.2-----	0.8- 4.5	2.6	19	95				
3.1-----	0.1- 6.8	2.3	20	95	0.8- 5.5	1.6	10	90
1.5-----	0.9- 7.9	3.3	10	50				
<i>Roof rat</i>								
800-----	1.4- 391.6	168.0	30	100				
400-----	20.7- 105.0	71.4	10	100	39.8-215.0	112.5	10	90
200-----	11.3- 142.5	52.8	30	100	46.1-152.5	66.3	10	100
100-----	4.1- 54.7	21.4	10	100				
50-----	7.4- 48.2	18.1	10	100	20.2-107.0	71.7	10	30
25-----	3.1- 34.4	11.9	10	80				
12.5-----	3.3- 5.7	3.8	10	70				
3.1-----								
<i>House mouse</i>								
800-----	52.0-1536.0	328.0	30	100				
400-----	58.8- 498.6	198.7	10	100				
200-----	34.0- 512.0	95.0	30	100				
100-----	23.3- 170.7	60.2	10	100				
50-----	16.8- 43.8	33.9	10	100				
25-----	6.8- 33.3	15.5	10	100				
12.5-----	3.3- 8.7	5.5	10	100				
6.2-----	1.0- 19.0	8.9	9	89				
3.1-----	0.5- 9.1	4.3	10	100				

NOTE: Critical dosages, as defined in text, are in boldface type.

There is evidence, both from a high degree of bait refusal and from an increase in bait refusal with increasing concentration, that PMP is detected by wild Norway rats and by mice. There is some evidence, from an increase in bait refusal with increasing dietary concentration on the first day of exposure, that both species of rats may detect the higher concentrations of warfarin. However, all three species tended to adjust to the flavor of the rodenticides so that secondary bait refusal was not significantly greater and was occasionally slightly less than the corresponding primary bait refusal. (Secondary bait refusal, also called "bait shyness," consists in a learned response frequently based

on illness induced by a poison.) Thus, the anticoagulants contrast strongly with the fast-acting rodenticides, which lead to more serious primary bait refusal and especially to almost complete secondary bait refusal. This observation does not contradict the fact that, as rodents became progressively poisoned with anticoagulants, they ate less and less food of both kinds.

Within groups in which all animals died, special analysis was made of the animals which survived more than 14 days. Study of the individual records showed that, with rare exceptions, all animals of the three species which survived more than 2 weeks took substantial

PMP				Diphacinone				Pival			
Total dosage		Number of animals tested	Percent mortality	Total dosage		Number of animals tested	Percent mortality	Total dosage		Number of animals tested	Percent mortality
Range (mg./kg.)	Mean (mg./kg.)			Range (mg./kg.)	Mean (mg./kg.)			Range (mg./kg.)	Mean (mg./kg.)		
0.0-164.0	64.0	10	80								
0.0-91.0	39.0	20	90					23.6-61.6	45.4	10	100
15.0-106.0	42.0	20	85								
7.3-48.3	25.5	9	100	3.8-12.3	8.5	10	100	6.0-18.6	10.3	10	100
12.5-55.6	37.6	10	30					3.8-29.9	9.8	10	90
				1.8-4.1	3.1	9	100	1.5-22.0	10.8	10	90
				1.1-2.4	1.9	10	90				
				3.4-5.2	2.0	19	95	2.8-8.0	6.5	10	10
				0.0-3.3	1.6	10	40				
140.0-432.0	256.0	10	80								
98.0-184.0	154.0	10	100								
24.0-272.0	81.0	9	89					31.9-156.0	61.6	10	100
22.5-205.0	81.0	10	70								
23.3-93.8	68.5	10	30					10.4-32.1	17.0	10	100
								1.2-24.8	8.0	10	100
								0.4-7.7	3.4	9	67
172.0-708.0	292.0	10	90								
20.0-222.0	100.0	10	90								
61.0-225.0	114.0	10	100					7.2-33.6	15.2	10	100
27.0-86.5	51.5	10	100								
25.5-148.3	61.8	10	70					2.2-8.5	4.3	10	100
								4.9-14.4	8.8	10	100
								1.8-13.2	4.3	10	100

NOTE: Critical dosages, as defined in text, are in boldface type.

amounts of poison; in fact, their longer survival permitted them to take, on the average, slightly greater total dosages than corresponding rodents which died sooner. Further, most of the rats and mice which survived more than 2 weeks took poison promptly when it was first offered. The few exceptions were refusals of PMP for 21 days or more, with the result that the animals did not receive an adequate dosage. It must be concluded that the unusually long survival periods of a few rodents exposed to effective bait concentrations usually were caused by unexplained properties in the metabolism of the individual animals and not by their failure to ingest poison.

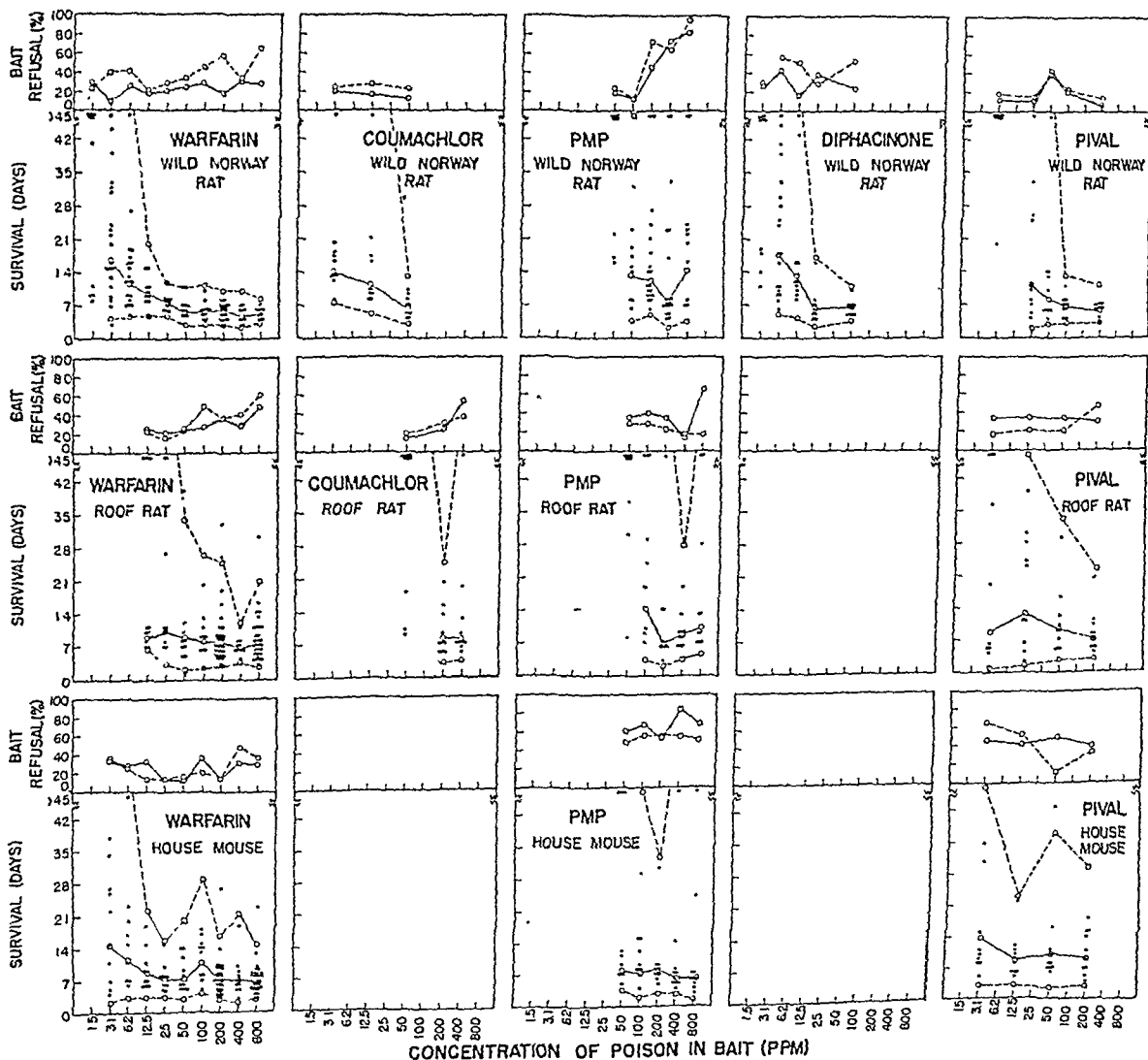
The time necessary to kill the first rat in a group was remarkably similar for the poisons studied irrespective of the concentrations at which they were fed. This is explained by the mode of action of the compounds. Death is the result of hemorrhage following the loss of "prothrombin" activity in the blood. A minimum period of time is required for the activity to be reduced and then for adequate hemorrhage to occur. This is true even in animals which suffer cerebral hemorrhage as well as those which die in the usual way from shock following more extensive bleeding at less critical sites. It appears from figure 2 that the average survival time of wild Norway rats fed

warfarin is not shortened to a practical degree by increasing the concentration of poison in bait above the minimum necessary for effective control. The same is probably true of other rodents and other anticoagulants; however, application of the principle to roof rats fed warfarin was obscured because of the great variability in the response of that species and in

other instances because few of the bait concentrations tested were above that which is minimal for control.

Analysis of the data revealed no differences in susceptibility based on sex in any of the three species studied. None of the females was pregnant. Earlier tests have shown that pregnant animals exhibit an increased susceptibility (1).

Figure 2. Bait refusal and survival time of rodents offered unpoisoned food and various concentrations of rodenticides in bait.



BAIT REFUSAL (percentage of total food intake which was unpoisoned): Dashed line, first day of experiment. Solid line, entire experiment.

SURVIVAL TIME: Dots, survival time for each

rodent. Open circles connected by solid line, geometric mean for the time of death of rodents that died; open circles connected by dashed line, 95 percent confidence limit.

Table 2. Critical dosage, bait refusal, speed of action, and variability of action characteristic of anticoagulant rodenticides

Species and rodenticide	Critical dosage (mg./kg.)	Critical concentration (ppm)	Bait refusal (percent)	Mean speed of action (days)	Variability of action (days)
<i>Wild Norway rat</i>					
Warfarin.....	4.2	12.5	25	5.8	5.1
Coumachlor.....	9.0	50.0	¹ 12	¹ 6.1	¹ 6.8
PMP.....	>64.0	>400.0	² 82	² 14.1	² 38.0
Diphacinone.....	3.1	12.5	22	6.3	4.4
Pival.....	10.3	50.0	7	5.7	5.0
<i>Roof rat</i>					
Warfarin.....	18.1	50.0	36	8.0	15.6
Coumachlor.....	>112.5	>400.0	² 54	² 8.1	² 12.4
PMP.....	>256.0	>800.0	² 64	² 10.4	² 13.0
Pival.....	17.0	50.0	30	7.4	14.7
<i>House mouse</i>					
Warfarin.....	5.5	12.5	12	7.7	12.4
PMP.....	>292.0	>800.0	² 68	² 6.3	² 17.3
Pival.....	4.3	3.1	42	8.6	14.5

¹ Determined at the critical concentration because no test was run at four times the critical concentration.

² Determined at the highest dosage tested because a dosage satisfying the definition of critical dosage was not found.

NOTE: For each characteristic, a low value is favorable.

Of the several poisons tested, only warfarin was tested against Wistar strain albino Norway rats, with the same experimental procedures. The results (tabulations not shown) were so very similar to those for the wild Norway rat that for practical purposes they could be substituted for them.

A few new observations on pathological changes caused by warfarin supplement those reported earlier (1). A very few rodents poisoned by warfarin show paralysis of the hindquarters for a variable period before death. In every instance encountered so far, this sign of illness has been explained by the finding at autopsy of limited hemorrhage in the central nervous system. A few other rodents die rapidly without the development of paralysis as the result of more massive cerebral hemorrhage.

Mice show a distinctly different pathological condition from that observed in the two species of rats. Slightly more than half of 105 mice examined showed a profuse, thin, serosanguineous exudate into the pleural cavity. Both the character and location of this exudate differ from anything consistently seen in rats.

The results of this study, summarized in table 2, appear to justify the following conclusions.

The performance of warfarin against the commensal rodents was not excelled by the other anticoagulant compounds tested. Diphacinone was about as good as warfarin against wild Norway rats. Pival was about equal to warfarin against roof rats and mice but, like coumachlor, somewhat inferior against wild Norway rats. In comparison with the other rodenticides tested, PMP was distinctly inferior against all three species of commensal rodents.

Discussion

The method of laboratory testing described is adapted especially to the bioassay of rodenticides in instances in which both the toxicity and the acceptability of the material are under study. Use of the method for estimating proper concentrations of slow-acting poisons against a given species of rodent should obviate field testing of inappropriate concentrations.

Several papers dealing with testing of anticoagulant rodenticides have been published (2-12). However, we believe that the method described here yields more complete and more practical information than do earlier methods.

Laboratory tests in which the rodents are fed

poison on alternate days only were considered. Norway rats fed warfarin on alternate days survived slightly longer than those fed the same concentration of the poison *ad libitum* because there was a delay in acceptance of the poisoned food when it was offered on alternate days. Crabtree (2) and Bonnet and Gross (6), in tests with warfarin against Norway rats, found that the result was the same whether the rats were fed the poison *ad libitum* or on alternate days. On the other hand, *Rattus hawaiiensis* survived twice as long when fed warfarin on alternate days as when fed *ad libitum* (6). In any event, when poison is offered on alternate days only, the test is complicated by baiting problems so that it becomes more difficult to know which variables are being measured.

Every effort should be made to determine rodenticide dosages which are effective and, at the same time, as cheap and safe as possible. The use of unnecessarily high dosages may compensate in part for careless mixing of the bait, poor bait distribution, and inferior technique generally, but adds to the expense and to the hazards inherent in the use of rodenticides.

In one of the original studies (13) on the analogs of 3, 3-methylene bis(4-hydroxycoumarin), the compound now known as warfarin was shown to have less activity than some of the other compounds when tested against rabbits. When many of the analogs were tested later against Norway rats, warfarin proved to be the most promising of the group. Since species differences do exist, it appears quite likely that, if the analogs were tested systematically against the roof rat, a poison more nearly suited to that species might be found.

Summary

A new laboratory method was devised for the rapid evaluation of multiple-dose, slow-acting rodenticides with respect to required dosage, bait refusal, and speed and variability of action. With this method, it was found that, in general, wild Norway rats are most susceptible and roof rats least susceptible to each anticoagulant compound tested. Wild mice tend to resemble Norway rats in susceptibility, but they resemble roof rats in the high variability of response. The performance of

warfarin was not excelled by the other anticoagulant compounds tested, although coumachlor, Diphacinone, and Pival were each about equal to warfarin against 1 or 2 species. PMP was distinctly inferior in performance. A short supply of animals prevented testing coumachlor against mice or Diphacinone against roof rats or mice.

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Specialized Training Courses in Environmental Health

The following courses are scheduled for March 1959 by the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio:

March 2-13. Basic Radiological Health. Fundamental technical knowledge needed for radiological health work, with stress on basic nuclear physics and chemistry. Prerequisite for several other courses.

March 2-13. Water Quality Management: Sanitary Engineering Aspects. Intensive training for sanitary engineers and others active in administration of water-quality management programs. Biological, chemical, and bacteriological phases included. Assignment to discussion panels made prior to the course on the basis of experience and interest.

March 16-20. Physical Analysis of Atmospheric Particulates. Emphasis on properties and physical behavior of particles and methods of sampling and evaluation. Laboratory exercises used in application of techniques.

March 16-25. Environmental Health Aspects of Nuclear Reactor Operations. Introduction to environmental health and safety aspects of nuclear reactor operations, especially off-site problems. Includes 3-day tour of reactor and waste disposal facilities at Oak Ridge National Laboratory, with lectures by ORNL personnel. Prior completion of basic radiological health course required.

March 23-27. Analysis of Atmospheric Inorganics. Broad, technical coverage of qualitative and quantitative analysis of pollutants, with emphasis on applicability and limitations of present methods. Includes laboratory practice.

Address applications to the Chief, Training Program, Robert A. Taft Sanitary Engineering Center, Public Health Service, 4676 Columbia Parkway, Cincinnati 26, Ohio, or the medical director in a regional office.

Signs

and

Symptoms

of trends in public health

The Medicine Man is a new 27-minute sound film on food faddism and nutritional quackery. Prepared by the American Medical Association from Food and Drug Administration cases, the film depicts a television commentator's investigation of two types of nutrition "quacks": the "health" food lecturer and the door-to-door supplement salesman who makes unwarranted claims for his product.

" "

A graduate Institute of Nutritional Sciences has been established at Columbia University for worldwide training of experts to combat malnutrition. Public health, science, and Ph.D. degrees will be offered, with opportunities for laboratory, clinical, and field research.

" "

Japan reports 1,558,000 births in 1957, compared with 2,678,000 in 1947.

" "

Iowa's campaign to "Save 100 Lives" a year has been such a success that insurance companies are cutting their rates. In 1 year, the traffic death toll was reduced by 21.7 percent, and during the last 5 months in 1958 automobile crashes were 10 percent less than in the same period in 1957.

" "

A report by the House Committee on Government Operations says the American consumer is being bilked out of \$100 million annually in the sale of so-called weight-reducing products.

The number of States and Territories with programs for mentally retarded children has grown from 4 to 44 in the last 3 years, the U. S. Children's Bureau reports.

" "

The need for more discrimination in the use of penicillin was cited in the *Chronicle of the World Health Organization*, September 1958. The report calls for education of medical personnel and the public and for regulatory restrictions of sales. From 1943, when penicillin came into general use, through 1957, some 1,000 deaths from anaphylaxis due to penicillin occurred in the United States alone.

" "

Arthritis sufferers with employment difficulties are for the first time being taught various jobs required in hospital operation. The 3-year \$100,000 vocational rehabilitation program is run by the New York Arthritis and Rheumatism Foundation in cooperation with the Long Island Jewish Hospital of New Hyde Park.

" "

What We Should Know About Alcohol, a manual for teachers and group leaders by Mildred H. Weiss, clinical psychologist, Cleveland Center on Alcoholism, is offered for use with slides on alcohol education, by the Cleveland Health Museum.

" "

Antimony in lemonade stored overnight in a cheap, enamelware pitcher poisoned 100 picnicking children, reports the Philadelphia Health Department.

When health officers apply for the commitment of mental patients to hospitals, the applications are expeditious and inexpensive, avoid court procedure, and are less traumatic for patient and family, the Butte County (Calif.) Public Health Notes reports.

" "

Following a report indicating that ground water supplies were being contaminated by synthetic detergents from cesspools in heavily populated areas, the Suffolk County Health Department (New York) tightened controls over the digging of private wells. No building permits will be granted without health department certification in areas which have no public water supply.

" "

Private-duty nurses in Washington, D. C., were authorized by the Graduate Nurses Association to raise their basic fee to \$18 for 8 hours service on October 1. The new schedule does not authorize extra charges for special cases or for evening duty.

" "

A new edition of the New York State Department of Mental Hygiene's Blondie calendar covering the years 1959-60 is now available for general distribution. The calendar contains 12 mental health messages, to be applied to daily experience.



Don't let your emotions run you.
You be the boss!
Temper tantrums and such are kid stuff.

1960

MARCH							APRIL						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31				

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Ecology of Foxes and Rabies Control

DAVID E. DAVIS, Ph.D., and JOHN E. WOOD, Ph.D.

A 5-year study of fox populations in the southeastern United States was undertaken to provide information applicable to the prevention of rabies. The research was designed to accomplish at least six objectives: to estimate numbers of foxes, to determine reproduction and death rates, to examine the extent of movement, to determine the prevalence of rabies in a random sample of foxes, to evaluate procedures for controlling their numbers, and to suggest possible trends in fox populations in the future. Results of the investigation, presented in detail in a series of papers in specialized journals (1-6), are here summarized and interpreted from the public health point of view.

The research was conducted in Georgia, Florida, and South Carolina, with Thomasville and Newton, Ga., as bases. This area was chosen for several reasons. First, rabies has occurred in these States for many years. Second, vegetation is typical of a great region from Virginia to Texas and thus findings should have wide applicability. Third, the Communicable Disease Center of the Public Health Service had in this area a laboratory which would provide certain services.

The basic philosophy of the research was that foxes are an integral part of the biological economy and should not be exterminated even if this

were feasible. It was believed, however, that their numbers should be held below a density at which rabies will occur and that control activities should keep the population below this threshold.

Census and Vital Data

The first step was to estimate numbers of foxes. A standard procedure of setting traps which permitted calculation of a simple relative census was developed (1). A number of traps were set according to specific rules. The traps were placed along dirt roads at intervals of 0.2 mile and examined each morning for 7 days. The proportion of stations that caught 1 or more foxes in 7 days was calculated (2). Thus, one trapping area might have a value of 0.15 and another of 0.30. These proportions are only relative measures. They simply indicate differences in number of foxes caught; they do not reveal absolute numbers of foxes. To determine absolute numbers of foxes, rather elaborate and expensive procedures are necessary (3). Fortunately, in most practical work a relative method is sufficient to indicate changes.

Since the number of foxes caught depends on movement as well as abundance, the trapping proportions can be used for comparisons of abundance only during periods when movements are constant (as measured by tracking patterns) or between areas of similar habitat. From several lines of evidence it seems clear that greatest movement occurs in the fall in this region. In six areas foxes were trapped in summer after the young were at large and again in the fall. The proportion of stations catching foxes was 0.09 in the summer and 0.18 in

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The research reported here was conducted under Grant E1040 from the National Institutes of Health, Public Health Service.

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A graduate Institute of Nutritional Sciences has been established at Columbia University for worldwide training of experts to combat malnutrition. Public health, science, and Ph.D. degrees will be offered, with opportunities for laboratory, clinical, and field research.

" "

Japan reports 1,558,000 births in 1957, compared with 2,678,000 in 1947.

" "

Iowa's campaign to "Save 100 Lives" a year has been such a success that insurance companies are cutting their rates. In 1 year, the traffic death toll was reduced by 21.7 percent, and during the last 5 months in 1958 automobile crashes were 10 percent less than in the same period in 1957.

" "

A report by the House Committee on Government Operations says the American consumer is being bilked out of \$100 million annually in the sale of so-called weight-reducing products.

The number of States and Territories with programs for mentally retarded children has grown from 4 to 44 in the last 3 years, the U. S. Children's Bureau reports.

" "

The need for more discrimination in the use of penicillin was cited in the *Chronicle of the World Health Organization*, September 1958. The report calls for education of medical personnel and the public and for regulatory restrictions of sales. From 1943, when penicillin came into general use, through 1957, some 1,000 deaths from anaphylaxis due to penicillin occurred in the United States alone.

" "

Arthritis sufferers with employment difficulties are for the first time being taught various jobs required in hospital operation. The 3-year \$100,000 vocational rehabilitation program is run by the New York Arthritis and Rheumatism Foundation in cooperation with the Long Island Jewish Hospital of New Hyde Park.

" "

What We Should Know About Alcohol, a manual for teachers and group leaders by Mildred H. Weiss, clinical psychologist, Cleveland Center on Alcoholism, is offered for use with slides on alcohol education, by the Cleveland Health Museum.

" "

Antimony in lemonade stored overnight in a cheap, enamelware pitcher poisoned 100 picnicking children, reports the Philadelphia Health Department.

When health officers apply for the commitment of mental patients to hospitals, the applications are expeditious and inexpensive, avoid court procedure, and are less traumatic for patient and family, the Butte County (Calif.) Public Health Notes reports.

" "

Following a report indicating that ground water supplies were being contaminated by synthetic detergents from cesspools in heavily populated areas, the Suffolk County Health Department (New York) tightened controls over the digging of private wells. No building permits will be granted without health department certification in areas which have no public water supply.

" "

Private-duty nurses in Washington, D. C., were authorized by the Graduate Nurses Association to raise their basic fee to \$18 for 8 hours service on October 1. The new schedule does not authorize extra charges for special cases or for evening duty.

" "

A new edition of the New York State Department of Mental Hygiene's *Blondie* calendar covering the years 1959-60 is now available for general distribution. The calendar contains 12 mental health messages, to be applied to daily experience.



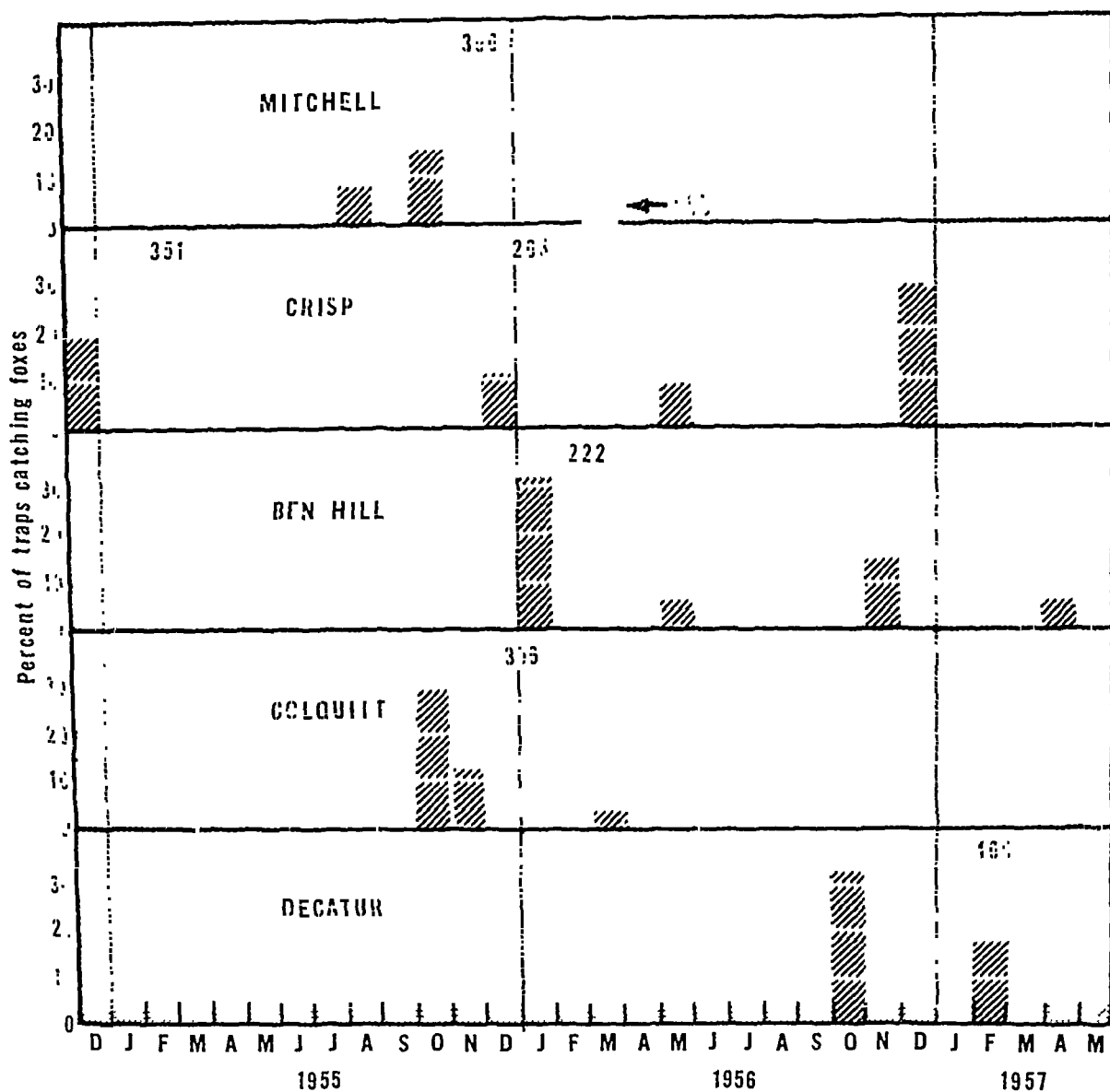
Don't let your emotions run you.
You be the boss!
Temper tantrums and such are kid stuff.

1960

MARCH							APRIL						
SUN	MON	TUE	WED	THUR	FRI	SAT	SUN	MON	TUE	WED	THUR	FRI	SAT
		1	2	3	4	5	1	2	3	4	5	6	7
6	7	8	9	10	11	12	8	9	10	11	12	13	14
13	14	15	16	17	18	19	15	16	17	18	19	20	21
20	21	22	23	24	25	26	22	23	24	25	26	27	28
27	28	29	30	31			29	30	31				

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Population index (proportion of trap stations catching foxes) before, during, and after a specified number of foxes were removed by trapping, five counties in Georgia.



WHITE AREAS: Periods during which foxes were removed by trapping. FIGURES IN WHITE AREAS: Number of foxes removed.

7 of these no positive fox was found in one trapping period when samples of from 9 to 83 foxes per county were examined. In the other 3 counties, 3.5 percent of 28, 11.3 percent of 62, and 8.8 percent of 147 foxes were positive for rabies.

These results demonstrate clearly that the detection of rabies in foxes by trapping on a sampling basis is not a sufficiently sensitive technique to be useful in predicting a rabies out-

break. The basic problem, of course, is that rabies occurs at a high prevalence in a few small areas. Thus, while in a large area only 3 percent of the trapped animals may have detectable virus, there may be many positive foxes localized in a few small habitats. Detection of rabies in foxes is very difficult under these circumstances.

The next step in the search for an indicator of future epidemics was to examine the density

the fall, but most of the increase in the index was due to increased travels of the foxes within their home range (3,5). In three large areas where movements were known as a result of capturing, marking, and releasing foxes, an increase in the number caught occurred in October and November.

The rate of increase of a population must be known in order to appreciate the efficacy of a reduction procedure or the recovery of a population after a natural calamity. Our research found that gray foxes averaged 4.5 embryos per female, that 96 percent of the females bred successfully, and that parturition occurred primarily in March and April (4). From these results we estimate that a population of 100 foxes in March will produce about 215 pups at birth. (We found no intra-uterine mortality.)

The rate of decrease of a population is equally important in evaluating numerical changes. To determine the mortality rate of foxes, a method of estimating age by tooth wear was developed (4). This permitted calculation of probability of dying from the age composition of various samples, using certain well-known assumptions. From these results it was found that the annual probability of dying is about 0.5 (annual death rate per fox=1.3). The life expectancy of an adult fox is 1.5 and that of a pup is about 0.9 years.

These mortality rates are surprisingly high, but they are coupled with a high rate of reproduction to produce a high proportion of young foxes in the population. In five areas in Georgia, Florida, and South Carolina, in which foxes were trapped in the winter, the percentage of foxes less than 1 year old varied from 48 to 61, and only 4 percent were more than 3 years old. The important conclusion here is that the fox population is essentially an annual crop. Control procedures and conclusions about prevalence of virus must recognize this situation.

Precise data on movement of foxes are difficult to obtain, but the question was explored by trapping foxes, tattooing a number in their ear, and releasing them in the expectation that some would be caught again and thus reveal some information about their movements. From the results it was clear that some foxes avoided recapture, but 56 were captured again. More

than half of these were recaptured within a mile of the point of release. An aspect of considerable importance is the tendency of foxes to remain together in groups, presumably familial (3). These groups disperse in early fall, and this dispersal apparently sets the stage for high mortality of pups.

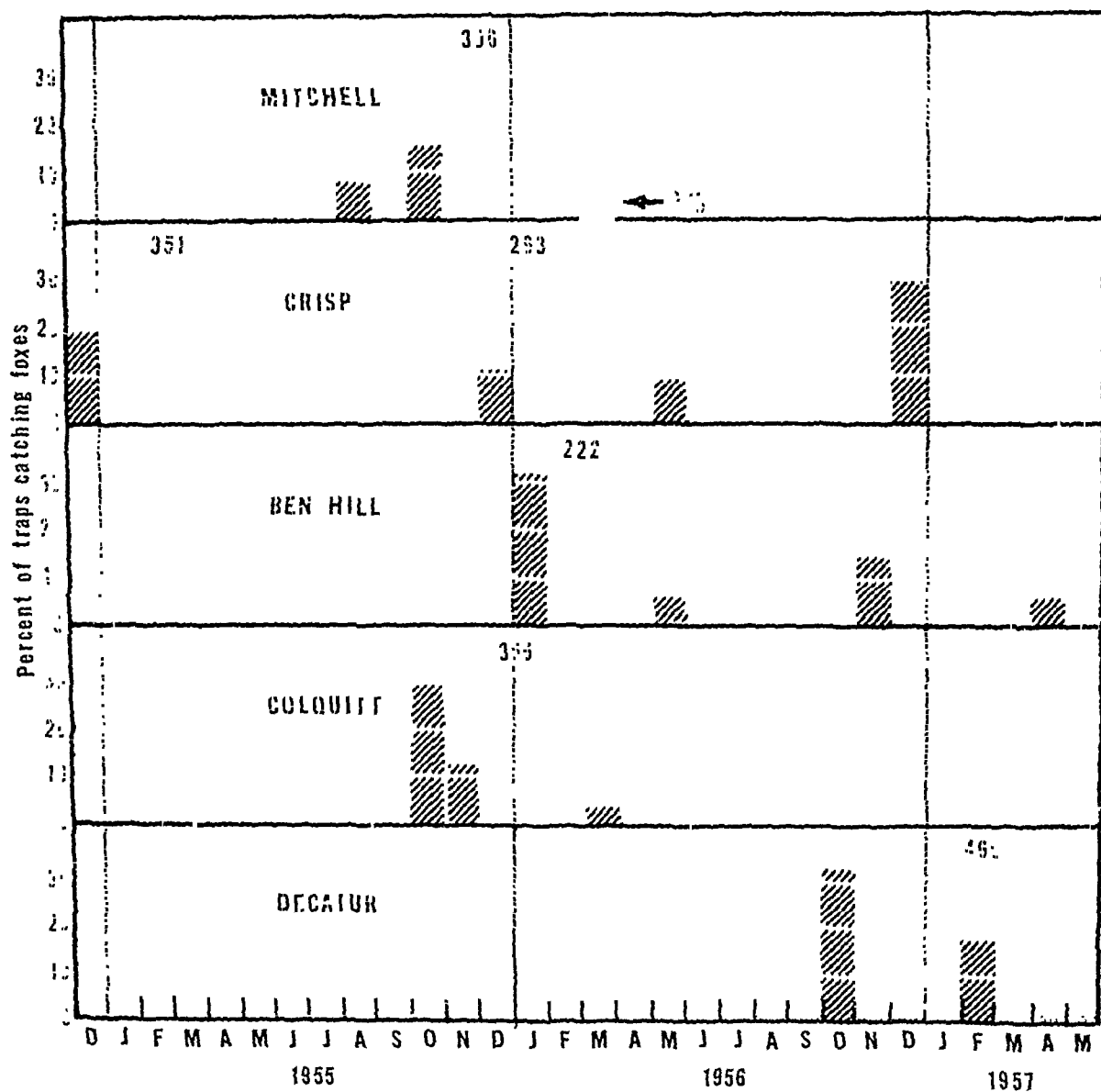
The relation of abundance of foxes to type of habitat is crucial to understanding current distribution and predicting future trends. Detailed analysis of trapping results shows clearly that foxes are most abundant in areas supporting cultivation (2). The population indexes were: cultivated areas, 0.22; savannah pine, 0.15; woods, 0.06. The agricultural trend in recent years has been from cultivated areas to woods (for pulp and timber) and pasture. This change greatly reduces the suitability of the area for foxes and should result in a decline in numbers.

Rabies Virus Prevalence

The prevalence of the rabies virus in the fox population was determined by examination of all fox heads from certain areas. This work was done at the Communicable Disease Center laboratory at Newton, Ga., under the general direction of Dr. Ernest Tierkel. Of 1,026 foxes, 32, or 3.1 percent, were found positive for rabies by virus isolation techniques (6). No statistical difference in prevalence between gray and red foxes was apparent, for 2 of the 117 red foxes were positive. None of the 299 raccoons or 215 opossums trapped was positive, but 1 of 89 bobcats and 1 of 144 skunks were positive.

The prevalence of the rabies virus differed, of course, from place to place. The data were analyzed to see whether the results could be useful in predicting an outbreak of rabies. The only practical geographic unit for this analysis was the county. In 5 counties that had not reported rabies in either man or animals for many years, none of the 133 foxes was positive. In 2 counties 2 rabid foxes were reported after an absence of reported rabies for 5 years, but examination of 93 foxes in these counties caught in 9 periods revealed no positive foxes. Ten counties had regularly reported rabies in humans or livestock for several years, but in

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Developments in nuclear science in the past decade have demonstrated many ways of putting radiation to use in solving classic problems in such fields as hydraulics, water quality, insect control, food preservation, and air pollution.

Applications of Radiation in Sanitary Engineering

D. A. PECSOK, M.S., H. P. KRAMER, M.S., and D. W. MOELLER, Ph.D.

DURING the past decade the sanitary engineer has frequently assisted in solving problems associated with environmental surveillance of radioactive materials and their management and disposition. Often his studies of such problems have indicated beneficial uses of these materials. For example, studies of specific radionuclides contained in radioactive wastes have provided information on ground-water flow. Similarly, application of water treatment methods to decontamination of radioactive liquid wastes has demonstrated mechanisms of water coagulation and softening.

Encouraged by such results, the sanitary engineer in more recent years has been making direct applications of radioactive materials to the solution of classic problems. Although use of radionuclides in sanitary engineering is still far from routine, a sizable number of applications have been reported and others are in prospect.

Hydraulics

Traditionally, flow characteristics imposed by pipes, tanks, and other boundary conditions are determined by use of a stable tracer material such as sodium chloride or fluorescein dye. Such material does not always yield measurements sufficiently sensitive for accurate tracing

of flow paths. On the other hand, radionuclides, evaluated for use under widely varying conditions, provide a highly sensitive technique for this purpose (fig. 1). No single radionuclide has proved ideal for all purposes, selection depending on several key factors:

1. Half-life of the radionuclide. It should be sufficiently long for practical application and sufficiently short for safe disposal.
2. Suitability for measurement by laboratory or field equipment.
3. Safety of personnel conducting the study and others who may be exposed.
4. Physical, chemical, and biological compatibility with the fluid.

For convenience in reviewing the various hydraulics studies of radioactive tracers, the following broad groupings have been made.

Pipe Flow

Radionuclide tracers for measuring fluid flow in pipes have found wide application in the pe-

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of foxes in relation to prevalence of rabies virus. The results in 24 locations showed no obvious relation between our measure of fox abundance and prevalence of rabies in the foxes. In 11 places where the prevalence varied from 2 to 33 percent, the abundance index (proportion of trap stations catching foxes) varied from 0.10 to 0.51. In 13 locations where no virus was demonstrated, the index varied from 0.06 to 0.40. Actually, there were significantly more captures in localities with recently reported rabies (0.29) than in those without recently reported rabies (0.22).

From this examination we conclude that neither the detection of virus in foxes nor the density of population of foxes is practical as a predictive measure. We thus accept the reporting of cases of rabies in animals and humans as the most promising method of maintaining surveillance of rabies, and we suggest greater emphasis on completeness and accuracy of reporting.

Evaluation of Control Methods

The next question for our research was, what are the most practical and most effective means of reducing fox populations? It is generally recognized that the best way ecologically to control a population is by manipulation of the habitat. Data summarized above suggest that the trend in the southeastern United States from small fields to forests or pasture will produce a reduction in foxes. Fortunately, this trend is expected to continue, but no other feasible habitat change is apparent.

The only alternative to habitat manipulation is killing foxes. Use of poisons should be rejected at once because it is nonselective. Trapping is feasible, and this method has been used for many years. Its effectiveness, however, needs more examination.

Records are available in five counties for the fox population before, during, or after a reduction program by conventional trapping methods (see chart). In four counties (Mitchell, Ben Hill, Colquitt, and Decatur) reduction in the fox population was substantial. In the

fifth county, some reduction was obtained, but the population increased subsequently.

Summary and Conclusions

In summarizing the data on fox populations applicable to the prevention of rabies, these points deserve emphasis.

Because of high birth and death rates, fox populations are essentially an annual crop. Thus, there are many new, susceptible foxes each year, and increase in numbers, even after a reduction, may be rapid.

Examination of prevalence of rabies virus in foxes or of abundance of foxes when conducted on the small scale that seems feasible is not sufficiently sensitive for predicting rabies outbreaks. Thus, the reporting of human and animal cases is still the best method of warning that preventive measures are desirable.

Trapping foxes will reduce their numbers, but the effect of such reductions on prevalence of rabies in the fox populations is yet to be determined. The agricultural trend in the southeastern United States from small farms to large tracts of timber or pasture should reduce fox numbers and consequently the amount of rabies.

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proved effective in the determination of stream flow patterns. Use of radium for this purpose was first suggested by Joly in 1922 (13). In recent years, radioactive materials have been used for evaluating stream capacities for radioactive wastes. Studies on the Mohawk (14) using phosphorus-32 demonstrated the concentration of radioactive phosphorus by biota. In addition, certain hydraulic characteristics of the stream were revealed. Scandium-46 was used in tracing sewage effluent discharged into Santa Monica Bay (15). A study on the Ottawa River (Ohio) in which salt, fluorescein, and rubidium-86 were tried in flow measurements indicated that these tracer materials produced similar results (3).

Tritiated water, because of its chemical similarity to normal water, should be an ideal tracer for flow studies of this type. However, it has found limited application because of difficulties in measuring it. Tritium has been used successfully, nonetheless, in tracing flow through a model of the Savannah Tidal Estuary (16).

Ground Water

The cation exchange properties of soils are a principal deterrent in selecting effective tracers for ground-water movement. Although Fox (17) successfully employed rubidium-86, the soil studied was a porous, sandy type, atypical of most soils. Kaufman and Orlob (18) concluded that only anionic tracers, such as iodine-131, or non-ionic tracers are suitable for ground-water tracing. Chelation has been suggested as a means of converting radiocations to non-ionic form for use as ground-water tracers. The process has been demonstrated successfully in the laboratory (19).

Use of tritium as a ground-water tracer is being studied. Its concentration in ground water is also being used to determine the water's age (20).

Flow of Solids

Settling or scouring of solids from liquid media can frequently be measured directly. In some instances, however, information regarding the interchange of solids is desirable. For example, the movement of silt in the River Thames has been studied through use of sand particles tagged with scandium-46 (6).

Floc particles bearing radionuclides have been used to determine removals by filtration media. In one such study, the effective depth of penetration of floc particles in sand filters was observed by use of iodine-131 tracer (21). In another study, iron-55 and iron-59 were used to evaluate graphite, anthracite, and sand as filtration media (22).

Water Quality

Analytical procedures employing radioactive tracers have been developed for both chemical and bacteriological contaminants in water. In many instances these procedures have markedly increased the sensitivity of measurement and have simplified assay methods as well. Radioactive tracers have been used also to determine removal mechanisms and related factors in various treatment processes designed to improve water quality.

Chemical Assay

For chemical assay, two basic approaches have been explored: radiometric titration methods and neutron activation analysis.

Radiometric titration techniques using nuclide tracers to sensitize the end point have been specified for chloride and sulfate determinations. Many other applications have been suggested (23).

Activation analysis has been widely accepted in many fields for the determination of trace quantities of more than half the known elements (24). The technique is based on the fact that most elements when subjected to neutron bombardment give rise to radioactive species of the same element. The radiations emitted by these materials are characteristic of the particular element. Through study and measurement of emitted radiations, it is possible to determine the quantities of stable elements originally present in the sample.

The recent application of the neutron activation technique to the analysis of drinking water promises to broaden and extend knowledge of water quality (fig. 2). Typical elements readily determined in water by this procedure include chlorine, bromine, iodine, copper, arsenic, manganese, barium, strontium, and sodium. Concentrations in the range of 1 part in 10^9 are easily detected (25).

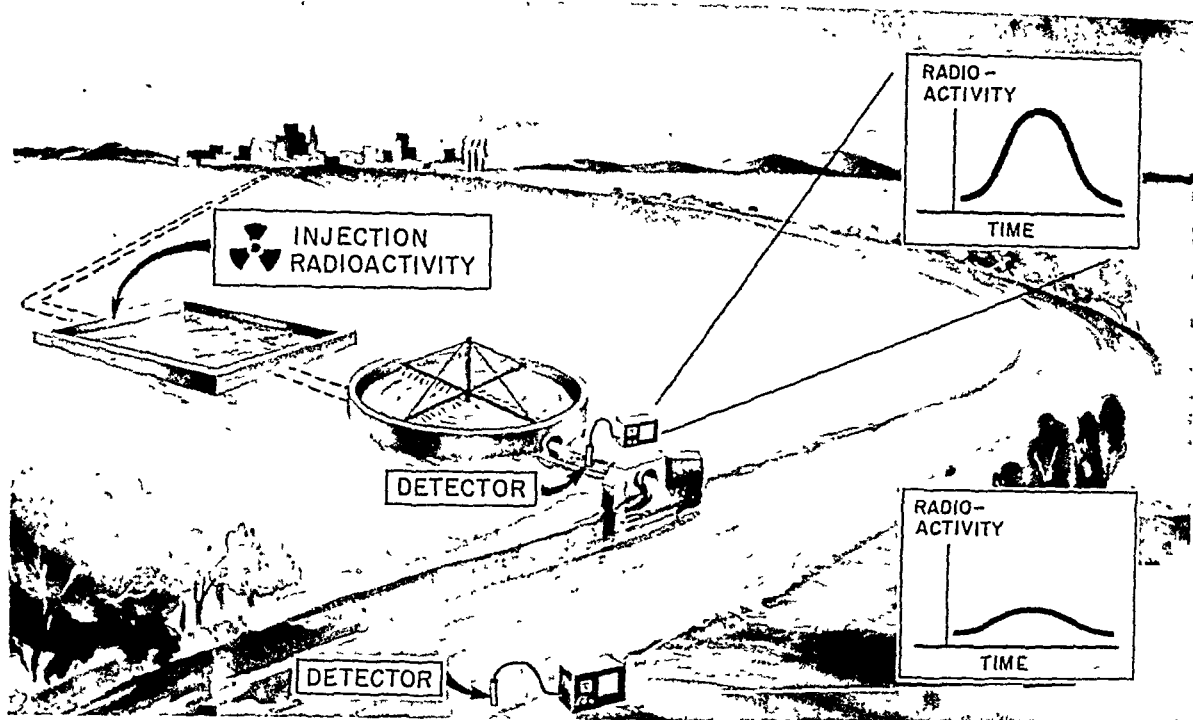


Figure 1. Hydraulics: Use of radiation in flow measurements aids study of tank design.

roleum industry. Their use enables flow measurement outside the pipe without disturbing flow conditions.

Studies on the longitudinal mixing of water in pipes, employing iodine-131, were reported as early as 1950 (1,2). The flow time within a milk pasteurization unit (short-time, high-temperature type) has also been evaluated with iodine-131 (3). Natural radon and added radium tracers have been used in studies of sewage flow (4) and outfall (5).

Leaks have been located in newly installed water mains through use of sodium-24. With this nuclide, a counting probe placed close to a pipe junction can detect leakage of as little as 100 milliliters (6). Unless the detector can be placed close to the leak, however, such methods are impractical. For example, to detect a leak 5 feet under ground would require a source strength equivalent to 3 curies of cobalt-60.

Tank Flow

Various radionuclides have been used successfully in determining detention time and dispersion in tanks. Radium was used by Hess in 1943 (7), but is no longer recommended because

of its high cost and toxicity. Today, manmade radionuclides such as sodium-24 (8) and potassium-42 (9) are being used for measurement of detention time in industrial plant systems.

For tracing sewage flow, biological compatibility of the tracer material is a principal factor. Rubidium-86 is most commonly employed, the first report of its use appearing in 1953 (10). In a comparative study of rubidium-86 and bromine-82, the flow characteristics of an anaerobic sewage treatment plant were determined (3). Similar results were obtained with these radionuclides.

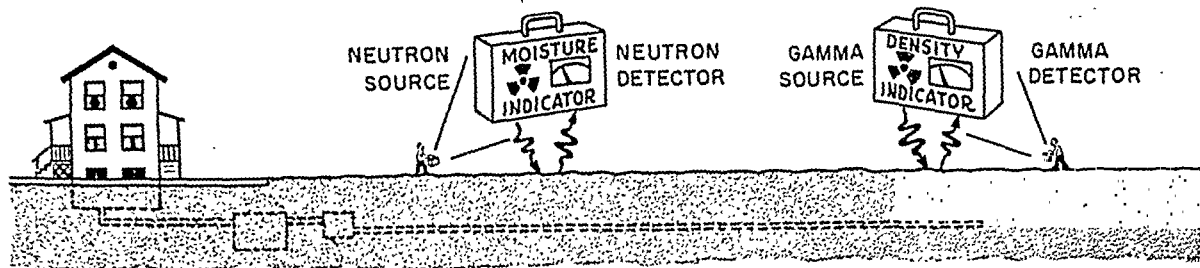
The dispersion of sewage in a 2-acre lagoon has also been determined. Here, with portable field instruments, iodine-131 tracer was measured (11).

Radionuclides are also being used in measuring silt at the bottom of large bodies of impounded water. The technique is based upon a density gauge which detects low-energy bremsstrahlung radiation (12).

Watercourse Characteristics

Many factors influence the diffusion characteristics of stream flow. Radionuclides have

Figure 4. Soil Properties: Field measurements of soil moisture and density show promise for use in designing household sewage disposal systems.



safety considerations. The neutron activation problems associated with the latter proposal might be particularly troublesome.

Studies have been made on the transport of sewage sludge through a digestion tank using raw sludge labeled with radioactive phosphorus (34). Beneficial information has resulted, particularly with regard to methods for stirring, adding, and withdrawing sludge from such systems. Use of radiation to develop new strains of biota for better oxidation of sewage has been proposed. This suggestion is based on the known ability of radiation to produce genetic changes. Through such changes improved strains of biota might result.

Other Applications

Applications of radiation in sanitary engineering cover a wide variety of other subjects.

Hydrology

Accurate predictions of runoff from snow packs are readily accomplished through use of gamma sources (35). Attenuation of the radiation by the snow itself permits accurate determinations of its depth. For example, with a 40-millicurie cobalt-60 source, depths having a water equivalent up to 55 inches can be measured and the information automatically reported from remote locations by means of a telemetering system (36).

Soil Properties

Density and moisture content of soils are amenable to measurement by use of radiation, and such measurements can be made directly in the field. In early studies, soil density was determined by the degree of gamma ray attenuation (37). In more recent developments,

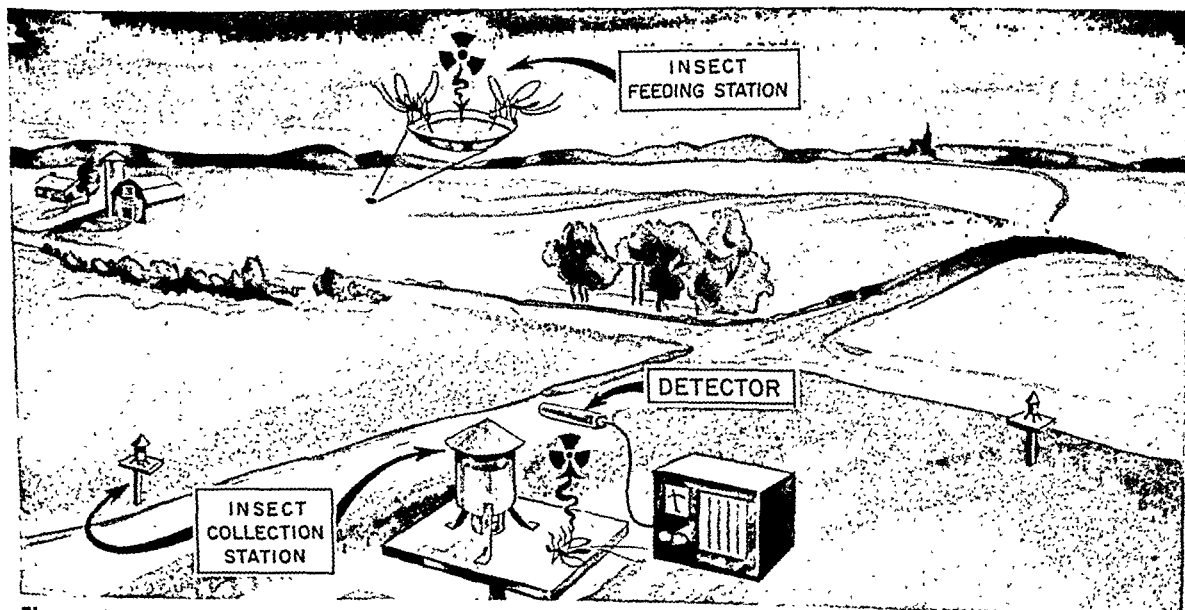
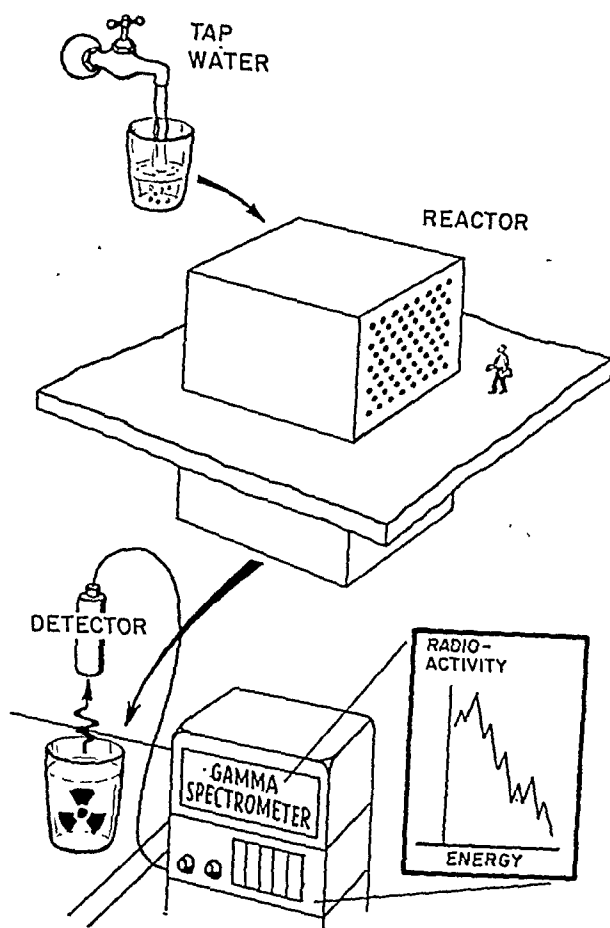


Figure 5. Insect Control: Feeding and migratory habits of insects are being studied with radiotracers.

Figure 2. Chemical Assay: Neutron activation provides an analytical method for both qualitative and quantitative determination of stable elements.



Bacteriological Assay

Basic knowledge regarding the metabolism of various food essentials by organisms has been expanded in recent years as a result of tracer techniques. A development which shows promise in the field of water quality assay is a rapid technique for the presumptive coliform test. This technique is based on the metabolism of lactose labeled with carbon-14 to form radioactive carbon dioxide (26). This metabolite, indicating a presumptive test, can be detected in as short an incubation time as 15 minutes (fig. 3).

Water and Waste Processing

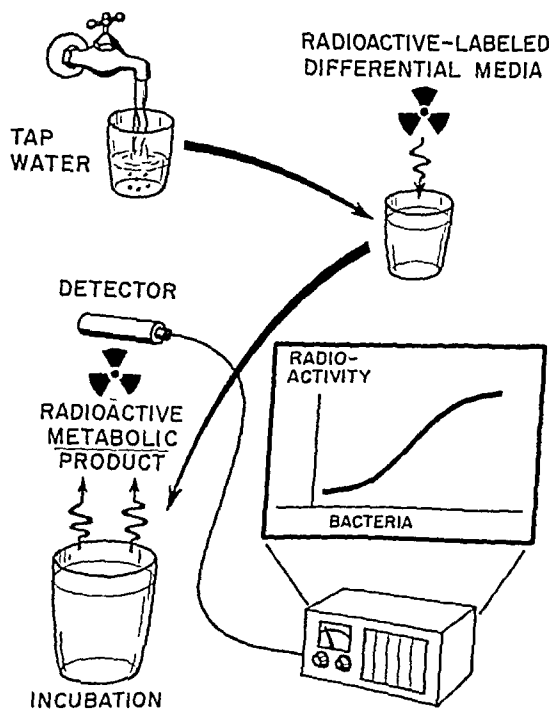
Corrosion and scale formation have concerned the sanitary engineer for many years. Today

studies employing radioactive materials promise to help him gain a better understanding of these conditions. Studies employing calcium-45 have yielded information regarding the mechanism of scale formation (27).

The mechanism by which phenol is adsorbed and desorbed from activated carbon has been investigated by using phenol labeled with carbon-14 (28). The fate of a detergent subjected to activated sludge treatment was studied by use of detergent tagged with sulfur-35 (29). With phosphorus-32 tracer, the phosphate cycle, including biota uptake and circulation, has been studied in lake water (30).

Gamma radiation for disinfection of water or sewage is frequently mentioned. Use of waste fission products in treating the material has been suggested; also sterilization of sewage by using it as a reactor coolant (31). Studies have indicated that high exposure levels (about 1 million roentgens) are required for disinfection (32,33). Hence, the feasibility of such irradiation methods is doubtful because of

Figure 3. Bacteriological Assay: Radiotracers may provide a rapid and sensitive method for the presumptive coliform test.



be endless. Hence, nuclear science is assisting substantially in attainment of the goal of sanitary engineering: the improvement of the public health, principally through the control of man's environment.

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density is measured by correlation with the amount of scattering of gamma radiation when a radiation source is placed in contact with the soil (38). Moisture-content measurements are based on the neutron-moderating properties of soils. A source of fast neutrons is used in conjunction with a slow neutron detector. For most soils, the number of slow neutrons detected is proportional to the hydrogen or water content (12). These techniques offer promise in establishing design criteria for rural sewage disposal systems (fig. 4).

Insect Control

Radionuclide tracers are providing information on the travel of insects, their feeding and parasitic habits, and other factors affecting disease transmission (fig. 5). As an example, the dispersal of mosquitoes and flies has been studied using phosphorous-32 and zirconium-95 tracers (39).

For control of certain insects, particularly the screwworm fly, gamma radiation is being used to sterilize the males and thereby interrupt the reproduction cycle (12). It is envisioned that within the next few years complete eradication of the screwworm fly in southeastern United States will be possible by this means.

Another approach to insect control is the use of gamma radiation to reduce insect infestation in packaged materials. Irradiation with cobalt-60 and fission products has been studied as a technique for ridding packaged foods of various species of beetles and flies (40). Exposures of about 65,000 roentgens are required to kill, 16,000 to 32,000 to inhibit reproduction. Irradiation has certain inherent advantages over chemical fumigation, particularly the ease of application and completeness of control (40).

Food Preservation

Research indicates that all types of food can be sterilized by radiation, regardless of the species or numbers of contaminating organisms. Certain side reactions, however, may make the food less wholesome, cause changes in taste or texture, or create toxic products (41).

Transmission of trichinosis through pork products is of particular public health importance. Studies of gamma irradiation of raw pork, with cobalt-60 or fission products, have

shown that transmission of this disease can be prevented without producing detectable taste changes (42). Radiation exposure levels of about 20,000 roentgens are sufficient to inhibit the maturation of trichina larvae (43).

Food Sanitation

Cleansing abilities of detergents are being evaluated through use of radionuclide-tagged soils and bacteria. Methods for the preparation of the soils have been formulated (44). Among a variety of radionuclides tried, phosphorus-32 has proved good for tracing bacteria. Through such applications, the relationship of cleansing efficiency to type of utensil, surface conditions, and type of organism has been evaluated (45).

Air Pollution

Radionuclides have proved successful in providing data on the dispersion and dilution of air contaminants and the effectiveness of control measures. A unique method of using a radioactive gas to trace dust aerosols has been reported (46). If a radioactive gas, such as thoron, is added to a dust aerosol, the radioactive atoms of the decay products will be adsorbed by the dust particles. The resultant radioactivity of the aerosol may then be used to characterize the finest suspended matter. Dusts, so labeled, have provided information on filter efficiencies, the structure of filter media, and the mechanism of operation of sampling and control equipment.

Another application in the field of air pollution investigation is neutron activation. For example, the dispersal of nonradioactive antimony oxide from a stack was traced through irradiation of collected air samples in the reactor at the Oak Ridge National Laboratory (47). With this technique, as little as 3×10^{-9} gram of antimony per cubic foot can be detected. This is a sensitivity exceeding that of the best chemical method. It is also interesting to note that under the conditions of the experiment no radioactive material was released to the atmosphere.

Conclusion

Essentially every phase of sanitary engineering has benefited from nuclear technology, and the potentialities of the applications appear to

Effect of Natural Fluorides On Caries Incidence In Three Georgia Cities

FRED D. LEWIS, JR., D.D.S., and
ERNEST C. LEATHERWOOD, JR., D.M.D.

DENTAL HEALTH services of the Georgia Department of Public Health and of the Public Health Service in Region IV were requested by the dental society, chamber of commerce, and health department of Savannah, Ga., to make a detailed study of the prevalence of dental caries in the children of Savannah in relation to the fluoride content of its water supply. The natural fluoride content of Savannah's water supply was approximately one-half the concentration recommended by the State health department. The question was: How much additional reduction in the caries attack rate would be derived from the adjustment of this concentration to the approved range?

A dental survey was planned for Savannah and two geographically comparable communities having known concentrations of natural fluoride in their public water system. It was estimated that Savannah had from 0.3 ppm to about 0.5 ppm fluoride concentration. The Georgia cities of Macon and Moultrie were chosen as controls, for, according to the water control laboratory of the State health department, the natural fluoride content of Macon's water supply was 0.11 ppm and Moultrie's was about 0.75 ppm. These concentrations were determined from water samples collected during a 3-year period, 1954-56. (Macon obtains its water from the Ocmulgee River, Savannah, from 11 deep wells and the Savannah River, and Moultrie from 3 deep wells.) Forty samples tested for Macon showed a range of 0.0 to 0.5

ppm fluoride in the water supply. Moultrie's range was 0.3 to 1.4 ppm in 52 water samples tested.

Macon would serve as the baseline while Moultrie would indicate the caries attack rates present at the lowest fluoride level recommended by the State health department. The optimum fluoride concentration as determined by the formula relating fluid intake to mean maximum temperature (*1*) approximates the natural fluoride concentration present in the Moultrie water system. The mean maximum temperature according to the U. S. Weather Bureau station in Atlanta and Athens, Ga., was 76.6° F. for Savannah, 77.6° F. for Macon, and 80° F. for Moultrie, over a period of 82, 57, and 24 years respectively.

Over the years, Savannah has continually expanded, outreaching and overtaking the public water system. To meet the increased demands, new wells were added directly to the water system at the point of greatest need. Today there are 11 independent deep wells and a surface supply with 2 separate pumps. Between March and October 1956, 138 samples from all water sources showed a range in fluoride of 0.0 to 0.8 ppm. The average fluoride concentration for each well ranged from approximately 0.31 ppm to 0.53 ppm, while the surface supply averaged about 0.06 ppm. This resulted in an overall numerical average of about 0.37 ppm fluoride concentration (table 1). Since records have been kept only in recent years on the fluoride concentration in the water system, the assumption was that the samples taken in 1956 would be indicative of the fluoride concentration in the water system for the entire life of the children examined.

The pumpage rate of each well fluctuated, depending upon the needs of the system, and since there was no common reservoir, there was no distribution constant. During 1956, the pumpage rate of individual wells varied from approximately 28 million to 1.4 billion gallons of water, and the surface source supplied about 35 million gallons. The inconstant pumpage rate and variation in the fluoride concentration necessitated the determination of a weighted average fluoride concentration in the water system for the year. By dividing the total

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Coordinator of International Affairs

A new position, Departmental Coordinator of International Affairs, has been established in the Department of Health, Education, and Welfare.

The new position will coordinate international activities related to health, education, vocational rehabilitation, social insurance, social welfare, and other areas within the Department and provide liaison with other Government departments and agencies having international concerns. The Department's operating agencies will continue to hold direct administrative responsibility for the international aspects of their programs.

Robert A. Kevan has been named to fill the new post. He served as special assistant to the chief medical director of the Veterans Administration and for 2 years was assistant chief of the Formosa field office of a management consultant firm before coming to the Department in March 1958 as assistant to the Assistant Secretary.

reason for extractions: orthodontic purposes, trauma, or otherwise.

3. Number of primary and permanent teeth needing extraction.

4. Number of unfilled carious teeth and number of surfaces involved.

5. Number of filled teeth and number of surfaces restored.

Findings

A total of 9,301 school children participated in this dental survey, 3,890 from Macon, 4,871 from Savannah, and 540 from Moultrie. Even though the number of children in Moultrie was relatively small, when the data from all three communities on caries-free children and on decayed, missing, and filled (DMF) teeth were subjected to the chi-square test, they were found to be statistically significant (4).

Table 2 shows the number of children examined as well as the percentage with caries-free permanent teeth. The total for all ages shows that for permanent teeth, 17.1 percent of the children in Macon are caries-free, while 23.3 percent of Savannah's children are caries-free, and 44.3 percent of Moultrie's children are caries-free.

The percentage difference in the total DMF rates, as shown in the last three columns of

Decayed, missing, or filled permanent teeth per child by age, Macon, Savannah, and Moultrie, Ga., 1956-57.

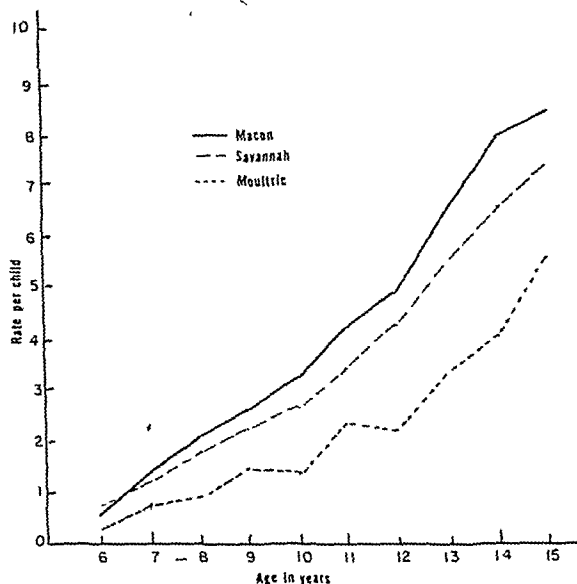


table 3, indicates that the children of Savannah have 35.6 percent fewer caries than those of Macon. Moultrie shows 60.8 percent less dental decay than Macon and 39.1 percent less than Savannah.

The difference in the decayed, missing, or filled rate per child at each age in the three cities is shown in the chart.

Table 3. Decayed, missing, or filled (DMF) permanent teeth, DMF rate per child, and percentage difference in DMF rate per child, by age, Macon, Savannah, and Moultrie, Ga., 1956-57

Age (years)	Number permanent teeth DMF ¹			DMF rate per child			Percent difference in DMF rate		
	Macon	Savannah	Moultrie	Macon	Savannah	Moultrie	Savannah over Macon	Moultrie over Savannah	Moultrie over Macon
6	197	365	16	0.53	0.66	0.23	+24.5	-65.2	-56.6
7	581	733	70	1.39	1.18	.88	-15.1	-25.4	-36.7
8	837	1,125	59	2.03	1.73	.97	-14.8	-43.9	-52.2
9	1,127	1,356	91	2.55	2.13	1.42	-16.5	-33.3	-44.3
10	1,264	1,236	83	3.14	2.59	1.30	-17.5	-49.8	-58.6
11	1,158	1,440	91	4.14	3.27	2.28	-21.0	-30.3	-44.9
12	1,451	1,733	80	4.84	4.16	2.16	-14.0	-48.1	-55.4
13	2,663	1,981	154	6.16	5.30	3.28	-14.0	-38.1	-46.8
14	3,597	2,461	208	7.99	6.21	4.00	-22.3	-35.6	-49.9
15	3,182	2,149	131	8.35	7.19	5.46	-13.9	-24.1	-31.6
Total	16,057	14,582	983	4.64	2.99	1.82	-35.6	-39.1	-60.8

¹ Exclusive of third molars.

Table 1. Average fluoride concentration in water supply, Savannah, Ga., 1956

Well No.	Gallons of water pumped	Number test samples	Fluoride range (ppm)	Average fluoride concentration (ppm)
1.....	220, 794, 332	11	0.4-0.8	0.53
2.....	317, 192, 899	11	.3-.7	.47
3.....	28, 474, 120	4	.3-.5	.42
4.....	1, 059, 072, 217	11	.3-.5	.45
5.....	1, 389, 495, 413	14	.3-.5	.34
6.....	407, 671, 408	14	.2-.4	.31
7.....	404, 160, 621	10	.2-.7	.35
8.....	1, 112, 522, 738	9	.3-.4	.32
9.....	788, 729, 221	13	.3-.5	.39
10.....	596, 650, 207	10	.3-.5	.38
11.....	179, 933, 182	7	.3-.5	.41
12 and 13 ¹	37, 398, 000	24	.0-.3	.06
Total.....	6, 542, 094, 358	138	.0-.8	.37

¹ Surface water supply.

parts fluoride from each well by the total number of gallons pumped, a concentration of 0.38 ppm was calculated.

Materials and Methods

A survey technique to obtain the required data was decided upon early in the planning stage (2). Participation in the dental survey was limited to white school children 6-15 years of age who were continuous residents, had used only the public water supply since birth, and had parental consent.

Careful dental examinations were conducted by two dentists, Hubert H. Martin from the

Georgia Department of Public Health and Ernest C. Leatherwood from Region IV, Public Health Service. A tooth surface was considered carious if the end of the dental explorer penetrated the soft, yielding tooth structure: if, in the case of pits and fissures, the explorer caught, supported its own weight, and met resistance when it was withdrawn; or if the surface had a carious lesion which was clinically obvious. The observations of the two examining dentists were recorded in code on the patient's chart (3) along with the following data:

1. Number of teeth erupted.
2. Number of permanent teeth extracted and

Table 2. Percentage of caries-free permanent teeth in children, by age, in Macon, Savannah, and Moultrie, Ga., 1956-57

Age (years)	Number of children examined			Percent children caries-free		
	Macon	Savannah	Moultrie	Macon	Savannah	Moultrie
6.....	371	554	71	48.2	49.3	76.1
7.....	419	622	80	40.3	42.1	58.8
8.....	413	652	61	25.7	29.4	50.8
9.....	442	638	64	18.8	23.7	40.6
10.....	402	478	64	10.0	16.9	46.9
11.....	280	440	40	10.0	13.9	27.5
12.....	300	417	37	6.3	9.4	32.4
13.....	432	374	47	5.1	9.6	27.7
14.....	450	397	52	3.1	5.5	21.2
15.....	381	299	24	1.8	6.0	16.7
Total.....	3, 890	4, 871	540	17.1	23.3	44.3

reason for extractions: orthodontic purposes, trauma, or otherwise.

3. Number of primary and permanent teeth needing extraction.

4. Number of unfilled carious teeth and number of surfaces involved.

5. Number of filled teeth and number of surfaces restored.

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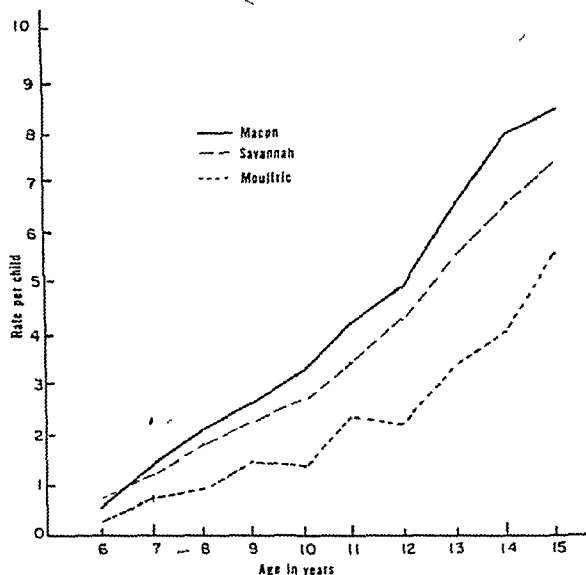


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10	1,264	1,236	83	3.14	2.59	1.30	-17.5	-49.8	-58.6
11	1,158	1,440	91	4.14	3.27	2.28	-21.0	-30.3	-44.9
12	1,451	1,733	80	4.84	4.16	2.16	-14.0	-48.1	-55.4
13	2,663	1,981	154	6.16	5.30	3.28	-14.0	-38.1	-46.8
14	3,597	2,164	208	7.99	6.21	4.00	-22.3	-35.6	-49.9
15	3,182	2,149	131	8.35	7.19	5.16	-13.9	-24.1	-31.6
Total	16,057	14,582	983	1.61	2.09	1.82	-35.6	-39.1	-60.8

¹ Exclusive of third molars.

Table 4. Number of primary teeth decayed or filled (df) and df rate for ages 6-11 years, Macon, Savannah, and Moultrie, Ga., 1956-57

Age (years)	Number of children examined			Number of df primary teeth			df rate		
	Macon	Savannah	Moultrie	Macon	Savannah	Moultrie	Macon	Savannah	Moultrie
6-----	371	554	71	1, 770	2, 253	260	4. 77	4. 07	3. 66
7-----	119	622	80	2, 004	2, 455	299	4. 78	3. 95	3. 74
8-----	113	652	61	1, 890	2, 437	214	4. 58	3. 74	3. 51
9-----	112	638	61	1, 587	1, 941	157	3. 59	3. 04	2. 45
10-----	402	478	64	1, 029	960	116	2. 56	2. 01	1. 81
11-----	280	440	40	301	486	23	1. 08	1. 10	0. 58
Total-----	2, 327	3, 384	380	8, 581	10, 532	1, 069	3. 69	3. 11	2. 81

An analysis of the decayed-filled (df) rate in primary teeth is presented for these cities in table 4. Moultrie has the lowest df rate for the children examined.

Discussion

From the findings, it is obvious that an inverse relationship exists between the caries attack rates and the concentration of fluorides in the water system of these three communities. Approximately one-fourth of the permanent teeth of the children examined in Macon were decayed, missing, or filled, one-fifth in Savannah, and one-ninth in Moultrie.

The DMF rates of the 12-14-year-old groups in Macon, Savannah, and Moultrie can be plotted upon Dean's graph of dental caries experience in 21 cities (5). The pattern is similar even though these rates occur in cities with a warm climate.

The DMF percentage difference between Savannah and Moultrie demonstrates decisively the additional protection against dental decay that could be achieved in Savannah by increasing the fluoride concentration of the water system from 0.38 ppm to at least 0.75 ppm (but no more than 1.0 ppm).

Conclusion

Savannah, with a natural fluoride content of about 0.38 ppm in the water system, is providing its children with 35.6 percent protection against dental decay. An additional 39.1 percent reduction in caries would be expected if

Savannah were to increase the fluoride concentration to equal Moultrie's (0.75 ppm). Macon, with only a trace of fluoride in its water system, would expect to reduce dental caries in its children by at least 60.8 percent with adequate fluoridation.

Summary

A dental survey of 9,301 continuously resident, white school children between the ages of 6 and 15 years was conducted in the cities of Macon, Savannah, and Moultrie, Ga., in order to determine the effect of different concentrations of natural fluoride in the water systems upon the rate of dental decay.

The natural fluoride concentration was approximately 0.11 ppm for Macon, 0.38 ppm for Savannah, and 0.75 ppm for Moultrie. The mean maximum annual temperature for these cities was 77.6° F., 76.6° F., and 80.0° F. respectively.

On a percentage basis, Moultrie had about twice as many caries-free children as Savannah and more than two and one-half times as many as Macon.

The decayed, missing, or filled (DMF) rate for permanent teeth per child was 4.64 in Macon, 2.99 in Savannah, and 1.82 in Moultrie.

Moultrie's DMF rate was 60.8 percent lower than Macon's and 39.1 percent lower than Savannah's; Savannah's was 35.6 percent lower than Macon's.

The decayed-filled rates for primary teeth were slightly lower in Moultrie than in the other two communities.

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Epidemiological Note

Smallpox

The recent occurrence of smallpox in Germany, which was introduced by a traveler from India, prompted the application of rigid requirements for vaccination of persons entering the United States from Western Europe. There was need for making the requirement apply to persons traveling from more areas than the one where the index case eventually was hospitalized. He had symptoms of the disease while traveling by plane from the Far East, and fellow travelers destined for various parts of Europe were exposed to infection. He also stopped in Switzerland before going to Germany. Secondary cases and one death have been reported, all of them from the area of Germany where the index case was found.

Failure to recognize the possibility of smallpox in persons traveling from infected areas has been followed by several localized outbreaks in Europe in the past

decade. In each instance, it has been necessary to apply rigid vaccination requirements for travelers from these epidemic areas before entrance into the United States.

The United States has not been immune to the introduction of the infection from other countries. In one instance in 1946, a soldier returning from Japan developed smallpox en route to Seattle. In spite of isolation, the disease spread, and there was a final total of 28 cases with 8 deaths. In 1947 a man traveling from Mexico City by bus presumably developed first symptoms of the infection en route to New York City. This case was not recognized as smallpox except in retrospect. In this outbreak, there were 9 cases with 2 deaths including the first case. These two outbreaks show very clearly what may happen if the infection is introduced and why rigid requirements for vaccination of persons subject to possible exposure are justified. Vaccination is required for protection not only of the traveler but also of the public.—DR. CARL C. DAUER, medical adviser, National Office of Vital Statistics, Public Health Service.



Water Hunter

Experience in ground water exploration sometimes pays off. After 2 months of exploratory work, contract technicians reported that no water was available for a certain small town in Brazil. An experienced engineer and a crew from Serviço Especial Saúde Pública located a 4-meter stratum of good, water-bearing sand 10 hours after they arrived in the area.

—E. ROSS JENNEY, M.D., *chief, Health and Sanitation Division, U. S. Operations Mission, Brazil.*

26 Million Tails

With all the returns counted in its nationwide campaign, the Ministry of Health and Social Welfare of the Republic of Korea has collected 26,994,758 rat tails. The 2-month eradication effort was to combat foci of typhoid fever. However, a second wave of the disease hit Pusan, where 97 cases including 8 deaths were reported, 3 months after the campaign ended.

—ALFRED S. LAZARUS, Ph.D., *chief public health adviser, U. S. Operations Mission, Korea.*

Teamwork

International teamwork helped Thailand combat a cholera epidemic in May and June 1958. Following news of the outbreak, 500,000 cc. of vaccine from the Serum and Vaccine Laboratories of the Philippines Government and an equal amount from reserve supplies in the United States were flown to Thailand. UNICEF sent equipment to produce the vaccine, and a United States Navy medical research team from Taiwan went to Bangkok to give bacteriological and epidemiological assistance.

The first cases were reported in Bangkok May 23, and the outbreak reached a peak 15 days later when 230 cases were reported. Twenty provinces reported cholera, and by the end of June, Thailand had nearly 6,000 cases with 868 deaths. The fatality rate, at first over 15 percent, dropped below 10 percent as

treatment facilities improved and intensive vaccination and health information campaigns gained momentum.

After a few cases occurred in neighboring Cambodia, mass inoculation began and preventive measures were publicized. Part of the vaccine used in Cambodia was produced at the Pasteur Institute in Phnom Penh, using equipment provided several years ago by the Agriculture Division of the U. S. Overseas Mission.

—ANDREW P. HAYNAL, M.D., *chief, Public Health Division, U. S. Operations Mission, Thailand, and*
CARLETON B. WHITE, M.D., *chief, Public Health Division, U. S. Operations Mission, Cambodia.*

Droit du Seigneur

In 1954, during one of my visits to the village training institute at Rahimyar Khan, West Pakistan, I showed a motion picture on constructing an earth privy. About 2 weeks later when I returned, I was met at the train by the institute's principal, several instructors, and many of the trainees. Their salaams were hasty and they seemed excited as they escorted me to a jeep and whisked me off to the institute, instead of to the resthouse, the usual first stop to unpack, bathe, and breakfast.

At the institute, as the trainees lined up, did a military right face and marched forward, the principal indicated I was to follow. The line of march halted 75 yards away in a corner of the campus. There, guided by the motion picture, the trainees had constructed an earth privy, complete with superstructure, the first ever built at the institute, and probably the first in the state of Bahawalpur.

A red ribbon was strung across the entrance, and the trainees indicated that I, their "uncle," a term young Pakistanis use to show respect to an older man, was to officiate at the opening. The students cheered and camera shutters clicked while I cut the ribbon. I repeated the act so that all the photographers could get their pictures.

I complimented the trainees and turned to go, but excited voices told me my ceremonial duties were not ended. Their American "uncle" was also to be the structure's first guest.

—ALEXANDER A. ROBERTSON, *health and sanitation adviser, U. S. Operations Mission, Thailand, formerly a member of U. S. Operations Mission, Pakistan.*

Disposal of Industrial Wastes by Irrigation

F. H. SCHRAUFNAGEL

RESPONSIBLE officials are interested in a waste disposal or treatment facility that is economical to build and operate, requires little attention, and still does a satisfactory job. Disposal by irrigation meets these specifications for some industrial wastes, and it has attracted a great deal of interest recently. Irrigation as a means of disposal is not new; this method was used extensively on sewage farms beginning in the 1860's and 1870's.

The two principal methods of using irrigation to dispose of waste water on the land are ridge and furrow irrigation and spray irrigation. In the ridge and furrow method, wastes are disposed of in furrowed plots. Early systems used a single or a few furrows, and the wastes were directed manually to another furrow when one was full, a technique that can also be used with contour furrows on sloping land. On relatively flat land, two or more plots are usually developed.

Wastes are discharged to a main or header ditch, which may be in the center of the plot or at the side, and then flow into the furrows which are nearly level but at a higher elevation. Furrows are 3 to 15 feet apart, 1 to 3 feet deep, and 1 to 3 feet wide. When wastes in one section build up to about 6 inches from the ridge tops, a control gate can be set for overflow into

another area. Control gates can also be used to take an area out of service for maintenance or to rest the land.

Compared with spray irrigation, ridge and furrow systems have a higher original cost and a lower operating cost, and can handle higher volumetric loadings. They have no problems caused by freezing during cold weather. But they are more likely to develop into a nuisance and may require additional land to get farther away from factories, dwellings, or public roads. Because land irrigated in this manner is difficult to crop, grasses are frequently left uncut, but noxious weeds must be destroyed.

Disposal by spray irrigation is a recent development in this country. The first installation of this type appears to have started operating in 1947. Only a few had been installed prior to 1950, but since that time use of this method has mushroomed. Wastes are sprayed onto the land, usually through revolving nozzles. Lightweight metal or plastic pipe is frequently used to convey wastes from a wet well or holding pit to the disposal field. Pipe sections can be moved easily to change spray areas, and, in some cases, extra piping and a valving arrangement can divert wastes to different locations.

The land does not require special preparation and moderate slopes can be tolerated. Woodland, brush areas, pastures, and cropland have been used successfully for waste disposal. Generally, it has been easier to obtain land for spray irrigation than for ridge and furrow systems. In a few cases, industry has been given use of land in exchange for the wastes and their possible fertilizer and moisture

Mr. Schraufnagel is associate public health engineer for the Wisconsin State Committee on Water Pollution at Madison. The article is based on a paper presented at the ninth annual meeting of the Middle States Public Health Association, April 28, 1958, Milwaukee, Wis.

value. Spray-irrigated grasslands are sometimes cropped. The biggest disadvantage of spray irrigation is the difficulty of operation during freezing weather. Some factories which dispose of wastes daily use spray irrigation during warm weather and ridge and furrow or other methods in the colder months.

Dairy Wastes

Dairies, many of them in rural areas and small villages close to the milk supply, are the source of the industrial waste most prevalent in Wisconsin. In June 1956, the State had a total of 1,625 factories engaged in the processing of milk and allied products from a yearly farm production of 16 billion pounds.

These factories create a variety of wastes, depending on the type of operations, the inclusion of concentrated wastes, and whether or not all or part of their cooling water is used in irrigation. The wastes may have a biochemical oxygen demand (BOD) ranging from less than 200 ppm for receiving station wastes to 15,000 ppm for a cheese factory discharging excess whey along with wash water wastes.

In 1954 the Mindoro Cooperative Creamery in western Wisconsin began operation of a ridge and furrow system with pumping facilities. Its irrigation area of about 3 acres is divided into 3 plots which are underlaid with 2 lines of drain tile. Cost of the completed system, including \$2,000 for land and \$2,000 for pumping facilities, was approximately \$8,000. This system accomplished a high degree of treatment; the BOD increase in the receiving stream is only 0.1 ppm, compared with 41.6 and 26.0 ppm before ridge and furrow facilities were installed.

About 20 other Wisconsin milk plants, mainly creameries, now have ridge and furrow systems. Minimum rates of waste disposal vary from less than 3,000 to more than 32,000 gallons per acre per day (gpad). Original costs ranged from \$300, for a small factory where 3 furrows were dug and gravity flow was used, to approximately \$25,000, for a large plant where the disposal field required extensive leveling.

A nuisance is more likely to develop in warm weather when a ridge and furrow system

is used for wastes with high BOD concentration; therefore, cheese factories have been encouraged to adopt spray irrigation. Occasional excess whey apparently can be handled without difficulty, but operators are cautioned about overloading systems with whey. Milk wastes have little gross solids in them, and elaborate screening is not required. The systems usually need a small basket screen or bucket with holes under the holding tank influent line to collect bits of curd, steel wool, brush bristles, and matchsticks, thus keeping them out of the nozzles. Scum and sludge will develop and accumulate in the holding tank, but this can be prevented by tapping off a $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch line beyond the pump, and returning some flow to the tank to agitate its contents.

Wisconsin now has about 30 milk plants using spray irrigation. Original cost, excluding land, ranged from \$300, for a small factory whose operators used old equipment and did most of the construction work, to \$5,000. Some disposal rates average only 2,000 gpad in extremely heavy soils while in favorable soils, rates of 10,000 to 15,000 gpad are sometimes achieved.

Six plants, mostly cheese factories in southern Wisconsin, continue spray irrigation during the winter. To prevent freezing in their systems these plants use a holding tank large enough to store 1 day's waste, a well-insulated pump and motor, and a heat lamp. The pump is started around noon, generally the warmest time of the day, and runs continuously for about 2 hours until the end of the work day. Pipes are supported on posts and slope back to the wet well. An icecap up to 2 feet thick may develop around the sprays. Most of the vegetation under the ice is permanently killed off, and these spots must be reseeded in the spring.

Waste temperatures of 90° to 100° F., an advantage for winter spraying, have been found at some of the cheese plants. A whey processing plant whose wastes at 135° F. killed vegetation solved this difficulty by extending the discharge to 10 feet above the ground and using a finer spray nozzle. Whey condensate at one plant caused corrosion of the aluminum pipe, which was replaced with copper tubing.



Ridge and furrow irrigation system serving a milk plant. Furrows lead away from the main, or header, ditch in the foreground.

Spray irrigation during the warmer months has vastly improved conditions around some milk plants where wastes previously were a nuisance. One operator felt the change was worth \$1,500 to him. In small communities near a resort area or a summer military camp where a milk plant contributes a significant part of the normal municipal waste, it may be easier and cheaper to irrigate the milk wastes than to enlarge sewerage facilities for the larger summer population.

Vegetable Processing Wastes

A 1913 report by the Water Survey of Illinois, mentioned in a 1939 bulletin, *Methods of Treating Cannery Wastes* (1), indicates that irrigation of pea and corn wastes in a large field gave best results. At the 1947 Purdue Industrial Waste Conference, Bolton (2) dis-

cussed Iowa canning plants which had started using ridge and furrow disposal 13 years earlier. In 1934 Iowa had 10 such installations for



The milk plant's system, photographed from the same point, after grass became established.

disposal of cannery wastes. He described the operations at the Hampton and Waverly plants in detail, since they had been functioning for several years. The Hampton cannery had a BOD loading of about one-ninth that of Waverly's, or 230 pounds of BOD per acre per day compared with 2,030 pounds of BOD per acre per day, although volumetric loadings for both averaged about 50,000 gpad.

Monson (3) reported that the Green Giant factory at Watertown, Minn., disposed of an average of 4.3 inches per day, or 116,000 gpad, on a ridge and furrow field. Generally, application rates for such systems range from about 5,000 to more than 100,000 gpad.

Canning operations are usually conducted during the summer when infiltration and evapotranspiration are highest. To my knowledge, no canneries in Wisconsin have used ridge and furrow irrigation exclusively for waste water disposal. However, in 1954 the California Packing Co. at Arlington used ridge and furrow for temporary disposal of wastes when its lagoon became full, and several pea viner stations have handled their stack juices by this method.

Spray irrigation of wastes from canning plants has become popular. There were no such installations in Wisconsin until 1951, when 11 were installed; by 1955, there were 40, representing 30 percent of the State's canning plants. The results, on the whole, have been gratifying, and many chronic pollution situations have been eliminated. The factories are requested to provide duplicate or standby pumping facilities, have thorough screening, and operate the system without ponding or runoff. When these conditions are met at an approved site, there is little danger of pollution or a nuisance.

Poultry and Tannery Wastes

A poultry processing establishment of Vallo-Will Farms, Inc., near Lake Geneva, Wis., treated its wastes, approximately 120,000 gpd with 220 pounds of BOD, in a high-rate trickling filter which accomplished an 80 percent BOD removal. This treatment was inadequate for the small receiving stream, and complaints were frequent. The effluent was chlorinated in

1954, and spray irrigation was started during the nonfreezing months. These measures eliminated discharges to the stream and also most of the complaints.

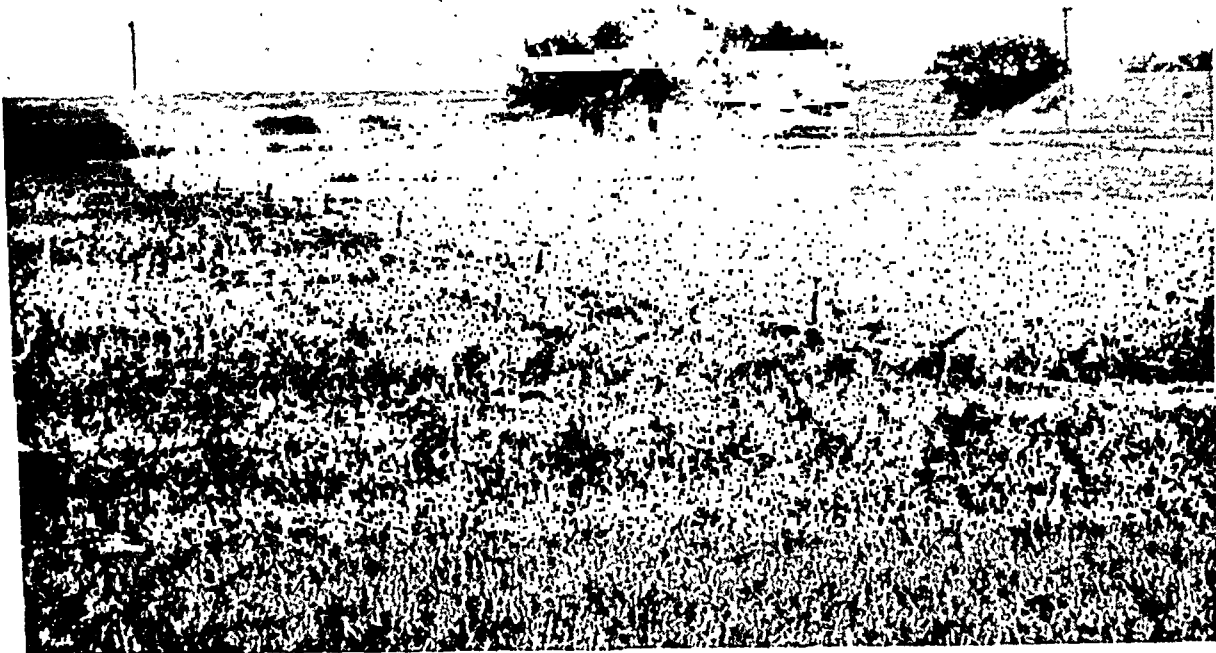
A ridge and furrow system was installed in the summer of 1957 when Edward Alf and Son of Endeavor, Wis., began operating a chicken processing plant. Two adjoining plots with a combined area of 1.05 acres and underdrained by two lines of 6-inch drain tiles were used. A "sparkling" effluent was noticed upon occasional observation, although wastes in the ditches and furrows are quite red. As yet, a detailed survey of the system has not been conducted. However, the waste volume amounts to an estimated 60,000 gpd on the 4 days a week the plant operates. A single grab sample from the drain tile in November 1957 had a BOD of 5.5 ppm. Solids, particularly feathers, are beginning to accumulate and improved screening is needed. An additional area of sandy soil is available for expansion.

A tanning plant which uses vegetable dyes in Pennsylvania spray irrigates wastes during critical stream periods from mid-May to late November (4). Wastes amount to 425,000 gpd and have a BOD of 2,300 ppm associated with a total solids concentration of 10,550 ppm. A 1,200-gpm pump, powered by a 150-hp diesel engine, applies the screened raw wastes to the land over a 6- to 7-hour period. Fifteen acres of land, whose soil consists of about 4 feet of sand over gravel, is used for disposal. Grasses were killed off originally, but in areas which are not sprayed for a time, vegetation grows profusely. A sludge layer accumulates and the plot is disk-harrowed every 3 weeks. Apparently no odor has been associated with spray irrigation of these wastes.

Pulp Wastes

Several Wisconsin pulping mills have experimented with and used irrigation to dispose of spent sulfite liquor. Approximately a ton of solids is dissolved from the wood for each ton of pulp produced. A 100-ton mill produces 200,000 gallons per day of this liquor, which has a BOD of 28,000 to 40,000 mg. per liter.

Studies of soil filtration were conducted by



Spray irrigation system in operation. Revolving nozzles are in a line perpendicular to the main line which crosses the foreground.

the Sulphite Pulp Manufacturers' Research League and reported by Wisniewski and associates (5). Ten-foot columns of mixtures of various media were used for experimental purposes, and different filtration rates were applied. Generally, BOD removal varied with the loading rates from a high of 95 percent, when 0.18 pound of solids was applied daily per square yard, to a low of 10 percent, with 12.3 pounds of solids. A field trial was made at a spray irrigation system, and removals of 40 percent were experienced with mean temperatures above freezing. During very cold weather the removal dropped almost to zero. In warm spring weather the BOD removal returned to about 30 percent.

In their report, the authors suggested consideration of the following principles of design and operation: (a) the effectiveness of microbiological reactions of the soil is greatly

reduced if loadings of unstabilized organic matter exceed the rate of complete reaction; (b) the amount of water fed to the soil must be so controlled as to avoid sustained periods of flooding and the anaerobic conditions which result from flooding; and (c) geologic conditions must be such as to avoid the possibility of contamination of ground water supplies.

The Flambeau Paper Co. at Park Falls began using the irrigation method of disposal for some of its wastes in 1954. During critical stream conditions spent sulfite liquor is hauled out to a 40-acre disposal area by truck. The trucks dump along the road, constructed on a ridge in the area, which is wooded and has rock outcroppings. A bulldozer is used to construct absorption ditches. An aerial survey showed that about 40 percent of the trees were killed.

This pulp mill also spray irrigates some of its wastes on a 2-acre island which has a bark and

sawdust fill. The system has been able to apply the wastes satisfactorily through the winter but with a marked reduction in effectiveness.

The Kimberly-Clark mill at Niagara disposes of up to 250,000 gpd of spent sulfite liquor to a plot of sandy soil over rock. A pump, mounted on a trailer, is towed behind a truck and fogs the wastes out to a distance of 40 feet along each side of the road at a rate of less than three-fourths of a pound of solids per square yard. Four miles of road have been constructed to carry out the disposal of wastes in this manner.

Irrigation treatment of pulping wastes is poor compared with the treatment of wastes from food processing industries, and there is also danger of the sulfite liquor concentrating in underground pockets and polluting ground water supplies for extended periods. For these reasons irrigation of pulp wastes is considered only a temporary means of disposal.

Meat Packing Wastes

Oscar Mayer and Co., Madison, Wis., began experimenting with irrigation disposal of wastes in 1951 and started field disposal in 1953. Wastes are pretreated to remove grit, paunch manure, and grease, then subjected to flocculation and sedimentation. Secondary treatment, accomplished through trickling filters and sedimentation, is provided before discharge either to the Madison Metropolitan Sewerage District or to the irrigation fields.

The plant has 200 acres of land available for irrigation. In 1954, 17 percent of its wastes were disposed of by irrigation, with an application rate during the irrigation period of 10,000 gpad. The largest daily waste quantity that has been irrigated is 2,900,000 gallons. Quantities may vary considerably from day to day depending on such factors as rainfall and cropping. Wastes were spray irrigated until 2 years ago when the practice was discontinued because of complaints about odor by residents of an area near the disposal field. But it was not shown that the complaints were justified. Since that time, disposal on land has been mostly by flood irrigation. Mosquitoes caused the most trouble in 1957, and the best method of control was to dry out the various disposal areas at least every 6 days. Diking and careful operation are required so that wastes do not overflow.

Because wastes containing nutrients for algae must be kept out of the Madison lakes, irrigation is carried on only during the growing season, from mid-April to early November, when vegetation utilizes the fertilizer constituents of the wastes. The high sodium concentration of the wastes, about three times the maximum acceptable for irrigation, may eventually cause a soil problem if this concentration is not reduced.

The purposes of the plant's system are to reduce the sewer service charges and to demonstrate the use of a waste effluent for land irrigation. Because the campus of the University of Wisconsin in Madison is nearby, the project has received close study from its inception, and information about it has been published. (7). Undoubtedly further findings will also be made available.

Evapotranspiration

What happens to an irrigated waste? Part is evaporated, some may be transpired, and the remainder is filtered away into the ground. A relatively small amount of mineral matter is used by the vegetation, but only water is transpired and evaporated so that the soil solution will contain higher quantities of solids than were present in the original waste water. The rate of evaporation of the liquid depends on temperature, humidity, and the area exposed, while the rate of transpiration depends mainly on leaf area, humidity at plant level, amount of solar energy, and available moisture. Under field conditions it is difficult to consider separately the water consumed by evaporation and that by transpiration, and the two are frequently lumped together as evapotranspiration, or consumptive use. The maximum consumptive rate for water is about 0.3 inch per day, or slightly more than 8,000 gpad during the hot, dry months. This rate is affected little by the type of forage crop. Normal evapotranspiration is 3,500 to 7,000 gpad.

Vegetation, by transmitting water and keeping the soil loose, is important to the success of a disposal system. Reed canary is probably by far the grass best suited for ridge and furrow irrigation plots in Wisconsin. It is a permanent grass and a heavy producer, has a substantial root structure, and endures water and ice sheet coverage very well. A seeding rate of

8 to 10 pounds per acre with the seed not covered too deeply is recommended. Brome grass and Kentucky bluegrass are probably next best suited, but they do not endure water and ice coverage as well. Some systems have developed good growths by seeding a mixture of these grasses. Trees and brush also do a good job of water transmission at some locations.

Pulp and tannery wastes from some plants have killed the vegetation originally present. The pH, temperature, or waste constituents may not have been suitable. Also, aeration in the root zone is considered essential for most vegetation. Hydrogen sulfide and nitrites are toxic to plant roots, and these compounds can be formed by waste decomposition when sufficient oxygen is not available. Occasional flooding can be tolerated, and flooding can be more frequent when plant life is dormant.

Opinions and findings as to what constitutes a suitable irrigation water vary greatly. Soil, drainage, crops, and climate are among the determining factors. Sandy and gravelly soils that are well drained can tolerate much higher concentrations than clay and poorly drained soils. Irrigation water is considered for total salts and the ionic concentration as shown by the water's specific conductivity; quantity of sodium and its ratio to other cations; amount of bicarbonate; and concentrations of boron, chloride, and sulfate.

Infiltration

Excluding the runoff, excess moisture can only percolate or infiltrate the soil at some periods. Evaporation and transpiration cease at times, and precipitation, in addition to waste waters, must also be handled.

According to Musgrave (6) the major factors that affect the intake of water by soil are surface condition and amount of protection against the impact of rain: internal characteristics of the soil mass, including pore size, depth, or thickness of the permeable portion, degree of swelling of clay and colloids, content of organic matter, and degree of aggregation; moisture content and degree of saturation; duration of rainfall or application of water; and season of the year and temperature of soil and water.

Musgrave also stated that, in the same soil, intake rates were higher when irrigation was

applied by flooding than they were from artificial rainfall; infiltration rates increased progressively from bare ground to row and cover crops; infiltration rates increased progressively for more than 20 years after a soil was taken out of cultivation; seepage was better when the soil was protected by mulch, burlap, or grass from surface compaction by raindrops; rates were better when wheat stubble was left than when the area had been burned off; and infiltration rates increased with temperature.

In a 72-hour continuing test with varying water and soil temperatures, the infiltration rate varied diurnally with the temperature from 0.18 inch per hour at 35° F. to 0.54 inch per hour at 70° F. Nearly an exact correlation was found between infiltration and viscosity. Musgrave also included a tabulation of more than 100 soil types tentatively arranged according to their minimum infiltration rates.

Treatment and Drainage

Waste is purified by micro-organisms as it filters through the soil. General principles of filtration indicate that progressively higher BOD reductions, within limitations, are achieved by finer filtering materials, lower rates, and warmer temperatures. Although much progress has been made in sewage treatment, we still have nothing that can produce a better effluent than the intermittent sand filter. The theory of sand filter operation indicates that the best results are achieved by giving the filtering media a chance for aeration.

Vegetation and drain tile should help maintain aeration of the soil, but intermittent operation may be advisable at times. A nearly complete removal of suspended solids and a large reduction in bacteria will be achieved by percolation through the soil pores. In addition to the treatment the wastes receive, irrigation usually acts as an effective flow equalization unit in distributing percolate flow and strength over 24 hours rather than the 6 to 8 hours per day that small factories operate, and stream improvement is greater than the degree of treatment indicates.

If a system is operating satisfactorily and has been properly located, there should be little danger of contaminating wells unless the disposal field is in an area with creviced limestone

near the surface of the ground or unless the waste contains sulfite liquor. This type of waste is acidic and concentrated, responds slowly to biological treatment, and can cause pollution over a long distance and time.

Some soils are naturally well drained, and, in others, drain tile can frequently be used to advantage. Drainage not only permits higher volumetric loadings but removes concentrated salt solutions and, through soil re-aeration favors the treatment processes involved in waste stabilization.

Care must be exercised in using drain tile. Difficulty from earlier drain tiling occurred at some dairy and cannery spray irrigation fields. Short circuiting due to shallow depth or broken tile and the effects of strong wastes must be watched. A minimum tile depth is $2\frac{1}{2}$ feet: vegetation growths increase with drain tile to depths of 3 or 4 feet. The water table between the tile lines will be arced, but even on tight soils it is doubtful if a distance of less than 20 feet between lines is warranted.

An open ditch or a nearby stream with a water level several feet lower than the furrows helps drainage. An irrigation system might be laid out parallel to the bank or on the inside loop of a meandering stream to insure good drainage.

Conclusions

In general, waste irrigation has accomplished a good degree of treatment at low cost. Adverse effects have occurred in only a few cases.

Waste irrigation is not a cure-all but rather should be considered as another method of treatment that can be used when conditions are suitable.

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Epidemiology Course for Nurses

A refresher course in communicable disease control stressing epidemiological principles and techniques will be held April 20 through May 8, 1959, at the Communicable Disease Center, Atlanta, Ga., for public health, industrial, and other nurses having supervisory, teaching, or consultant duties.

Courses include epidemiological principles, the laboratory and statistical methods in field epidemiology, and nursing care in communicable disease for which field practice can be arranged.

There is no fee for the course. Applications should reach the Center by April 1, 1959. They may be obtained from the Chief, Nursing Section, Epidemiology Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street, NE., Atlanta, Ga., or from State health departments.

The Epidemiology of Leptospirosis in the United States

MILDRED M. GALTON, Sc.M.

DURING the past 70 years extensive investigations have shown that leptospirosis occurs in humans and animals in all parts of the world and that it is not a single disease but a group of diseases caused by a variety of leptospiral serotypes. Although considerable attention has been directed to the study of leptospiral infections by European and Asian workers since the early 1930's, much of our knowledge regarding the epidemiology, public health importance, and distribution of these diseases in the United States has been gained only during the past decade.

The epidemiology of the leptospiroses has been shown to follow a characteristic pattern based, in part, upon the fact that they are zoonoses, diseases transmitted from animal to animal and from animal to human. The chain of transmission, with rare exception, stops with human infection.

For many years rats and dogs were considered to be the primary animal carriers, but as the search for leptospires continues the host range broadens not only among domestic animals but in a variety of feral mammals (1). Leptospirosis now constitutes a major problem in cattle and swine, and in some areas sheep, goats, and horses become infected. The rat is one of many rodent carriers including mice,

voles, and shrews (2-4). In addition, bats, mongooses, bandicoots (5), jackals (6), foxes, opossums, raccoons, skunks, and wildcats (1) have been found infected. In these host animals, leptospires become localized in the kidneys and may be found in the lumina of the convoluted tubules. They may be shed in the urine for long periods.

Each leptospiral serotype usually is thought to have a primary animal host but it may infect other animals, and a so-called primary host for one serotype may become infected with other serotypes or even harbor two types at the same time (7). A classic example of this is *Leptospira canicola*, found principally in dogs; it has also been isolated from cattle (6), swine (8), and jackals (6), and serologic evidence suggests it may infect raccoons (9). Dogs have been found to harbor at least nine other serotypes (10).

Differentiation of the rapidly increasing number of pathogenic leptospiral strains is highly important from an epidemiological and epizootiological point of view. This became apparent to the Dutch workers in the early 1930's who found that classification of leptospires must be based upon serologic analysis. During the next 20 years these investigators studied antigenically distinct strains isolated in various parts of the world and developed techniques for serologic identification. Finally, in 1954, Wolff and Broom (11) published a suggested classification scheme based on antigenic analysis which included 34 leptospiral serotypes isolated from man and animals. In the 3 years since this report, approximately 25

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additional serotypes have been described in Australia (12,13), Africa (14), Europe (15), and Malaya and the United States (16).

Serotypes in the United States

The primary *Leptospira* serotypes in the United States appear to be the more common types, *L. icterohemorrhagiae*, *L. canicola*, and *L. pomona* in domestic animals and humans. However, 7 other serotypes have been isolated, and serologic findings suggest the presence of at least 2 others. The cause of "Fort Bragg" fever was identified as *L. autumnalis* 8 years after the initial outbreak (17). Six years later the first animal host for this type in the United States was detected when the organisms were isolated from the kidneys of raccoons trapped in southwest Georgia (18). *L. ballum* has been found frequently in rural house mice and opossums and occasionally in rats and laboratory mice (19,20). Recent evidence has shown that 1 proved and 7 probable human cases due to *L. ballum* contracted from Swiss white mice occurred among laboratory workers at the Public Health Service Rocky Mountain Laboratory, Hamilton, Mont. (21). Serologic evidence suggests the presence of *L. baturiae* infection in humans (22), *L. sejroe* in cattle (23,24), and *L. grippotyphosa* in humans (25) and cattle (23). During recent cultural studies at the Communicable Disease Center's Newton Field Station, Ga., on wild mammals, *L. grippotyphosa* was isolated from raccoons trapped within 60 miles of a Florida farm on which cattle showed antibodies to *L. grippotyphosa* in 1952. In addition, these studies have revealed the presence of *L. pomona*, *L. australis* A, three serotypes that belong to the *mitishyos* serogroup, one of which has been tentatively designated *L. bakeri* (16), and a member of the *hebdomadis* serogroup in wild mammals. It is notable that 61 percent of the leptospiral isolates from striped skunks proved to be *L. pomona*. The highest prevalence of infection has been found in the striped skunk, opossum, and raccoon although occasional isolations have been obtained from the spotted skunk, the gray fox, and the wildcat.

Although comparatively little attention has been directed toward the study of wild mam-

mals elsewhere in the United States, Reilly reported serologic evidence which suggested *L. canicola* infection in raccoons in New York (9), and Roth recently isolated *L. pomona* from opossums in Louisiana (26). In a recent survey of wild animal serums in Ohio by the divisions of wildlife and animal industry, Ohio Department of Agriculture (27), leptospiral antibodies against *L. pomona* were detected in 43 (19 percent) of 224 samples from deer, 16 (22 percent) of 70 serums from raccoons, 14 (25 percent) of 55 serums from foxes, and 6 (54 percent) of 11 serums from skunks. Current information regarding the occurrence of leptospiral serotypes in the United States is summarized in table 1 (28).

Transmission

In the transmission of leptospiral infections to humans, the animal carriers which may become urinary shedders after acute, mild, or more frequently inapparent infection, serve as important foci. Infections of humans and other animals result from direct or indirect contact with infected urine of these shedders. For example, direct contact may occur when people care for sick animals, fondle a pet dog, or handle the tissues of infected animals in abattoirs. Indirect contact occurs when the organisms are excreted in water or moist soil, and people are subsequently exposed while swimming, working, or otherwise coming in contact with the contaminated environment.

Although arthropod vectors have not been incriminated as yet in the transmission of leptospirosis in nature (29,30), several investigators have been able to infect ticks by allowing them to feed on infected guinea pigs or hamsters. These experimentally infected ticks transmitted the disease to normal animals. However, recently *L. grippotyphosa* was isolated from the European tick, *Dermacentor marginatus* S. from cattle in Russia where isolated cases of leptospirosis had occurred among farm animals (31).

During the acute phase of leptospirosis in lactating animals, leptospirae may be shed in the milk, but no human cases have been attributed to drinking infected milk. This may be explained by Kirschner's (32) observation that

Table 1. Occurrence of leptospiral serotypes in the United States

Serotype	Known host	Occurrence			
		Man	Dogs	Cattle	Swine
<i>L. icterohemorrhagiae</i>	Rat	Common	Occasional	Rare ¹	?
<i>L. canicola</i>	Dog, cattle	Occasional	Common	Rare	Rare
<i>L. pomona</i>	Swine, skunk, raccoon, wildcat, opossum.	Occasional	Rare	Common	Common
<i>L. autumnalis</i>	Opossum, raccoon	Rare	?	?	?
<i>L. ballum</i>	Mice, gray fox, opossum, wildcat, rat, raccoon, striped skunk.	Rare ¹	?	?	?
<i>L. grippotyphosa</i>	Raccoon, red fox	Rare ¹	?	Rare ¹	?
<i>L. bataviae</i>	?	Rare ¹	?	?	?
<i>L. sejroe</i>	?	?	?	Sporadic ¹	?
<i>L. hebdomadis</i> serogroup (LT117).	Opossum, raccoon	?	?	?	?
<i>L. australis</i> A	Opossum, raccoon, gray fox	Rare ¹	?	?	?
<i>L. bakeri</i> ²	Opossum	?	?	?	?
<i>L. mitis-hyos</i> serogroup (LT81).	Opossum, raccoon, skunk, fox	?	?	?	?

¹ Serologic evidence only. ² *Mitis-hyos* serogroup.

whole milk is leptospiricidal and the organisms survive in it only a few hours.

The leptospire usually enter the body through the mucous membranes of the conjunctivas, nose, or mouth, or abrasions on the skin. It is doubtful that these organisms penetrate the intact skin, and it is unlikely that the digestive tract is an important portal of entry since the pH of the stomach is usually such that the organisms may be quickly destroyed.

Environments that favor the survival of leptospire outside the body include moist soil, stagnant ponds or slow-moving streams that are

neutral or slightly alkaline, and a temperature of 22° C. or above. When these conditions exist in nature, leptospire may survive several weeks (33,34).

Outbreaks and Sporadic Cases

Under such environmental conditions, several large outbreaks have occurred in the United States following swimming in contaminated water. Since 1940, there have been 4 outbreaks in Georgia (28,35,36), 1 in Alabama (37), and 1 in Wyoming (38) involving more than 150 in-

Table 2. Reported outbreaks of leptospirosis in the United States¹

Date of onset	Location	Number of cases	Age range	Probable source	Leptospiral serotype involved
August 1940	Wrens, Ga.	35	16 (average)	Offal from slaughtered cattle in creek.	<i>L. pomona</i> ²
July-August 1942, 1943, and 1944.	Fort Bragg, N. C.	³ 40	Young adults (soldiers).	?	<i>L. autumnalis</i> .
August 1942	Jackson Hole, Wyo.	⁴ 24	15-19	Dogs, deer, or other animals.	<i>L. canicola</i> .
August 1947	Calvary, Ga.	10	13-24	Dead mule in creek (?)	?
August 1949	Swainsboro, Ga.	12	Young adults	Cattle	<i>L. pomona</i> ³
July 1950	Geneva, Ala.	50	Adolescents and young adults.	Swine	<i>L. pomona</i> ¹
July 1952	Columbus, Ga.	26	5-20 and two adults	Swine, dogs, cattle	<i>L. canicola</i> .

¹ With the possible exception of the Fort Bragg outbreaks all were attributed to swimming in water contaminated by infected animals. ² Serologic evidence only. ³ Each year. ⁴ Nine confirmed serologically.

dividuals. All these waterborne leptospiral outbreaks followed a similar pattern. They occurred in the late summer during drought periods: there was presumed contamination of a stagnant pond or slow-moving creek by urine from infected animals and transmission to humans by immersion in the contaminated water. The patients were young, primarily children ranging in age from 5 to 16 years but also some young adults.

An outbreak of pretibial fever occurred among troops at Fort Bragg in August 1942 and again in the summers of 1943 (17) and 1944 (39-41). All patients were quartered in the same general area of the post. Many had been swimming in the nearby ponds but not all, so the source of their infection remains obscure. These reported outbreaks are summarized in table 2 (38).

An unusual family outbreak was reported recently by Haunz and Cardy (42). The family, including the parents and seven children 5 to 16 years of age, lived in a converted boxcar without sanitary facilities. Drinking water was kept in a bucket, and the family dog occasionally drank from this bucket. The dog was sacrificed and leptospires were demonstrated in sections of kidney tissue. All members of the family became ill within 1 month.

In recent years, reported human cases of leptospirosis in the United States have increased. Cases reported from 1905 to 1948 were summarized by Molner and his co-workers (43) according to geographic distribution. During this 43-year period there were 220 cases in 24 States, 8 cases unspecified as to location, and 78 cases in Michigan reported by these authors, making a total of 306 cases for the period.

In contrast, a summary of patients showing positive serologic tests in CDC's laboratories during a 5-year period (1953-57) plus cases reported to CDC by State health departments or to the National Office of Vital Statistics during this time revealed a total of 445 cases in 40 States. In addition, 94 cases occurred in outbreaks reported between 1951 and 1956 (fig. 1).

Occupational Hazards

The leptospiroses are frequently referred to as occupational diseases. Certainly, oppor-

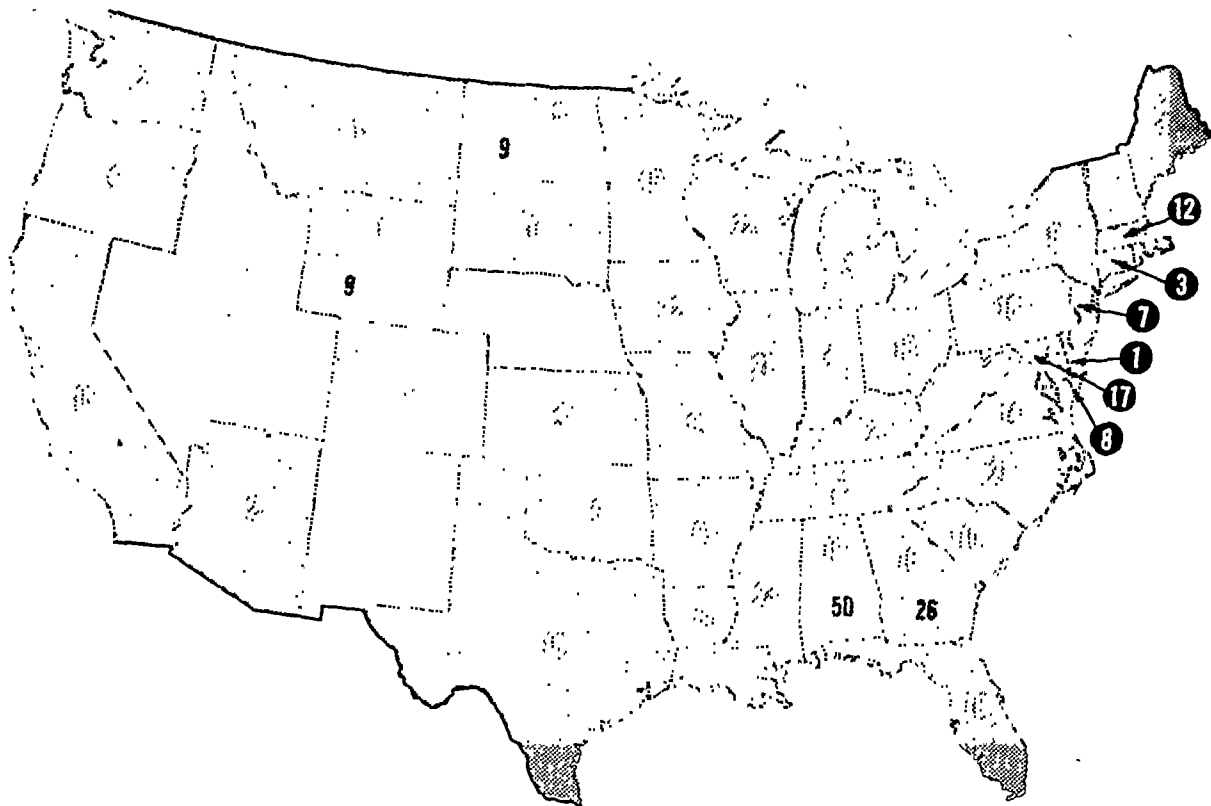
tunities for exposure are encountered more frequently by veterinarians, animal husbandrymen, swine herdsman, and workers in abattoirs, sewers, dairies, and poultry and fishhouses.

In Europe, Asia, and Australia leptospirosis is an important health and economic problem among agricultural workers, particularly in the ricefields and canefields (44,45). The apparent lack of this problem among agricultural workers in the United States may be attributed to higher living standards and to mechanization of agricultural operations. For example, in Italy the flooded ricefields are worked by hand laborers in their bare feet; in the United States the work is done mechanically. In the United States also, protective clothing, boots, or heavy shoes are usually worn to perform other tasks on farms requiring contact with contaminated soil.

During the past 4 years information has been obtained regarding 130 cases of leptospirosis that occurred in 30 States and the District of Columbia. Knowledge of these cases came primarily from serologically positive serums referred by State health departments to the Diagnostic Microbiology Unit, CDC. Subsequent inquiry to the State epidemiologists usually resulted in a history of the case. Others were reported by State health departments or the National Office of Vital Statistics, or they were investigated, on request, by the *Leptospira* Research Laboratory staff. Information concerning the probable source was obtained on 89 of the 130 cases. Of these, 32 (36 percent) had had contact with infected cattle or swine either in abattoirs or on farms; 23 (26 percent) had been drinking, swimming, or accidentally immersed in presumably contaminated water; 14 (16 percent) had had contact with dogs in their homes or in veterinary hospitals; 12 (13 percent) were exposed to rats; 3 (3 percent) to wild animals; and 5 (6 percent) to other animals or possibly contaminated environments in their occupation. Of these 5 individuals, 1 was a bulldozer operator, 1 a tractor driver, 1 a rice-field worker, and 1 had contact with an infected goat. The fifth person had been confined to a city jail for approximately 10 days prior to onset and may have had contact with infected rodents.

The fact that the probable source of more

Figure 1. Occurrence of human leptospirosis in the United States, 1953-57.



NOTE: 445 patients (white figures) showing positive serologic tests in CDC laboratories and cases reported by State health departments, 1953-57. 94 cases (black figures) reported in outbreaks, 1951-56.

than one-third of these cases was found to be contact with infected cattle or swine may be attributed, in part, to the rapid spread of bovine leptospirosis in the United States. York (46) reported occurrence of the disease in only 12 States prior to 1951. By 1956 it had been recognized in 42 States, according to data obtained from a summary of animal morbidity reports sent to CDC, published reports, and positive serum samples examined at CDC (28). In 1954 the Agricultural Research Service of the U. S. Department of Agriculture (47) estimated that annual losses from bovine leptospirosis were more than \$112 million, or \$25 million greater than losses from bovine brucellosis.

Since it has been estimated that 25 percent of the dogs in this country have or have had leptospirosis and 25 to 50 percent of these become temporary carriers, the opportunities

for exposure among children would be expected to be high, although Broom in England (48) observed a low infectivity rate among dog owners and their families. Recent investigations in the Leptospirosis Research Laboratory on leptospirosis in dogs in the Atlanta, Ga., area failed to detect leptospiral antibodies in serum from about 50 persons who had contact at home with 10 dogs infected with *L. canicola*. However, of the 14 persons with leptospirosis throughout the United States in which exposure to dogs was known, 10 had contact with sick pets in their homes and 4 worked in veterinary hospitals.

Age, Sex, and Seasonal Prevalence

As a result of environmental and occupational factors, the epidemiological pattern of human leptospiral infection has certain charac-

teristic features related to age, sex, and season. Although these infections may attack individuals of all ages, conditions are most favorable for infection of young adults. Beeson and Hankey (49) observed that the leptospiroses occur most frequently in the United States in males above the age of 15 years due to the occupational factor. In a series of 24 cases they found the age range was 10 to 55 years, but 19 (70 percent) were less than 30 years of age and only 5 of the patients were female. A distinct seasonal incidence was observed, with 10 (41 percent) of the cases occurring in August. Molner and associates (43) reported a similar age, sex, and seasonal distribution among 78 cases studied in the Detroit, Mich., area. In this series, 70 (90 percent) of the patients were more than 20 years of age and 73 (93 percent) were male, providing further evidence of an occupational relationship. Although sporadic cases occurred throughout the year, a definite increase was noted from August through November.

During the past 4 years the *Leptospira* Research Laboratory has gathered information on 130 cases of leptospirosis in 30 States and the District of Columbia. Patients ranged in age from 2 to 73 years, but nearly half were between the ages of 20 and 39 (fig. 2), and 88 percent were male. The highest incidence, 41 percent, occurred in the 3-month period from July through September (fig. 3).

Figure 2. Age distribution of 71 cases of leptospirosis in the United States, August 1954–May 1958.

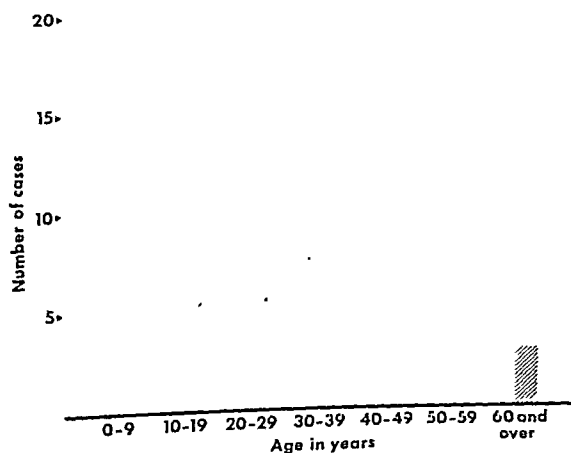
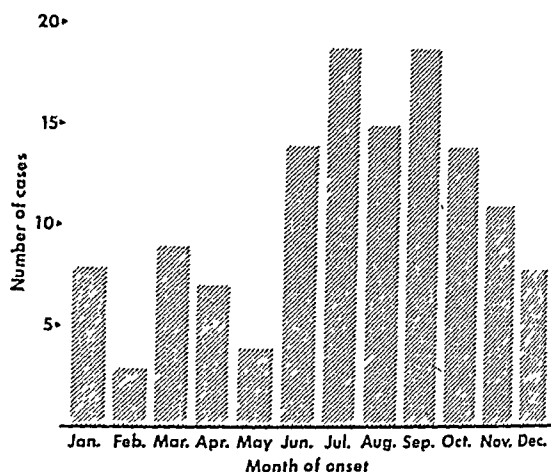


Figure 3. Seasonal distribution of 130 human cases of leptospirosis in the United States, August 1954–May 1958.



These observations regarding age, sex, and seasonal distribution of the leptospiroses in the United States are in accord with the findings of European investigators with possibly one exception. In certain agricultural areas where fieldworkers are predominantly women, there may be more women than men with leptospirosis (44).

Summary

The leptospiroses are a group of diseases caused by a variety of leptospiral serotypes. They are associated with a broad animal host spectrum and are transmitted from these animal carriers to other animals and to man. Transmission occurs by direct contact with infectious urine and with tissues of infected animals or indirectly through contact with contaminated water. The mucous membranes and abraded skin are usual portals of entry.

While *Leptospira icterohemorrhagiae*, *Leptospira canicola*, and *Leptospira pomona* have appeared to be the primary serotypes involved in human and domestic animal infections in the United States, the detection of serotypes hitherto unrecognized in this country emphasizes the need for public health, medical, and veterinary laboratories to search for them. Further study of the new feral mammal hosts will be necessary to determine prevalence of infection in other parts of the country and to determine their role

in the epidemiology and epizootiology of the disease.

Outbreaks have occurred in the United States and most other parts of the world as a result of swimming in ponds or slow-moving creeks contaminated by domestic or wild animal shedders. These outbreaks are usually observed during the late summer and affect primarily adolescents and young adults. Sporadic cases occur frequently from occupational exposures among veterinarians, abattoir workers, sewer workers, dairy workers, poultry and fishhouse workers, and animal husbandrymen. Information concerning the probable source of 89 human cases of leptospirosis that occurred in the United States from 1954 through 1957 revealed that 32 (36 percent) had had contact with cattle or swine either in abattoirs or on farms. The disease has been reported in the United States predominantly in young males in the 20-39 age group, and it appears more prevalent between July and November than in any other months.

Recognized cases of leptospirosis in humans have appreciably increased in the United States, and the disease in cattle has spread rapidly.

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Control of Leptospirosis in Man and Animals

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COMPLETE control of leptospirosis in man depends on the elimination of the infection in carriers. After acute or, frequently, inapparent infections in domestic and wild animals, the organisms become established in the kidneys and may be shed with urine chronically. Urinary shedders of leptospire are primary vectors: the infection passes to other animals and to man by direct or indirect contact with infected urine.

Preventive measures have most often been aimed at the leptospire outside the body of its host (1). In the past, control methods pursued the destruction of the leptospire by chemical agents, heat, or desiccation; or they were designed to prevent the leptospire from gaining access to the susceptible host by ratproofing, confinement, or protective clothing. At present, immunization of susceptible populations and elimination of carriers by antibiotic treatment are being emphasized. In some instances, however, the best means of control may lie in the prevention of contact. For example, in the United States, most outbreaks of leptospirosis in humans (primarily in children and young adults) have occurred as a result of swimming in stagnant pools or streams contaminated by infected urine from animals. Notices placed in schools and service establishments might prove effective in warning swimmers of their risk.

Vaccines

Leptospirosis among certain occupational groups such as abattoir workers, dairy farmers, animal husbandrymen, veterinarians, sewer workers, plumbers, and miners may be con-

trolled by vaccination. Early investigators reported the excellent immunogenic properties of *Leptospira icterohemorrhagiae* killed with phenol (2), heat and phenol (3), and heat alone. In Japan, thousands of persons have been inoculated successfully with these vaccines. Babudieri (4) has controlled leptospirosis caused by *L. icterohemorrhagiae* and *L. bataviae* in ricefield workers in Europe by vaccinating with a formalized vaccine. The choice of serotypes in the vaccines was determined by the epidemiological situation. In countries where the disease is a serious problem, immunization of the population at risk has not been widely practiced.

Although vaccines have not been used for humans in the United States, their use in domestic animals is becoming quite commonplace. As a means of controlling the disease by establishing immune animal populations, vaccination holds great promise. The vaccines that have been developed include the egg-propagated *L. pomona* bacterin of York and Baker (5), and the culture bacterin of Brown and associates (6). Hoag and Bell (7) have described a soluble antigen which protected calves, and a strain of *L. pomona* attenuated through more than 500 egg-passages has been evaluated as an immunizing agent by Kenzy and co-workers (8).

From 1 to 3 weeks are required for the development of immunity following vaccination, and

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the duration of this immunity has been reported for periods varying from 18 to 20 months (8). Young calves may be protected by vaccination of the dams during late pregnancy (9) and young pigs by vaccination of the sows (10).

Stoenner (11) has suggested prompt vaccination of an entire herd when the disease is diagnosed early. Since leptospirosis may spread rapidly, any delay in vaccination would minimize the protective effect of the vaccine. If abortions or other symptoms of the disease have occurred for 3 or more weeks, an immunizing agent is of little value in preventing further losses. Herds of this category should be tested, and only serologically negative animals, replacements, and calves born during the next 6 months would require immunization.

Improvements in the vaccines are needed before general control by vaccination can be achieved. None of the vaccines currently in use provides protection against all the leptospiral serotypes that have been isolated from animals in the United States. The vaccines available for cattle and swine provide protection against *L. pomona*, and those for dogs, against *L. canicola* and *L. icterohemorrhagiae*.

Herd Management and Sanitary Measures

Herd management and sanitation have considerable value in prevention and control. The factors in general herd management which afford protection against leptospirosis include isolation of sick and aborting animals, provision of sanitary quarters that can be easily cleaned, and provision of sanitary feeding and watering conditions, with special emphasis on watering tanks that prevent contamination. New animals should be held in quarantine for a period of 1 month or more before they are introduced into the main herd.

When the disease is diagnosed during the early phase of an epizootic, Stoenner (11) recommends prompt alteration of husbandry methods to effect an environment unfavorable for the spread of infection. Feed and water should be given in a manner which would prevent contamination with urine. Natural streams or surface waters are readily contaminated with urine of recovered carriers and should not be used

as sources of water. Farm ponds located in pastures should be drained or fenced and the cattle should be watered from tanks. The aprons surrounding these tanks should be free of seepage or overflow. Roughage should be fed from portable racks which can be moved frequently. Whenever possible, crowding of cattle in confined quarters should be avoided. On dairy farms, milk from cows should be pasteurized before being fed to baby calves. Horses, swine, and cattle should be kept in separate pastures.

Treatment of Carriers

Curing carriers by treatment has been tried by several workers. Ringen and co-workers (12,13) reported on attempts to eliminate the carrier condition in cattle infected with *L. pomona* by dihydrostreptomycin and terramycin therapy. Their findings suggested that dihydrostreptomycin given intramuscularly at a level of 5 mg. per pound of body weight every 12 hours for 3 days eliminated the carrier state. They demonstrated also that 2.5 mg. of tetracycline hydrochloride per pound of body weight was the minimal dose, since the 2.0 mg. level failed to prevent the development of carrier animals. The tetracycline hydrochloride was given intramuscularly once daily for 5 days. Baker and associates (14,15) found that in swine, disinfection of urinary shedders was accomplished as a result of 7-day feeding of terramycin at 500 gm. per ton of rations. He concluded that a program of high-level, short-term terramycin feeding to pregnant sows and gilts would significantly reduce losses from leptospirosis. Brunner and Meyer (16,17) found that streptomycin and aureomycin were possibly effective in clearing the urinary carrier state of hamsters and dogs infected with *L. icterohemorrhagiae* and *L. canicola*.

Wild Animals

Vaccination and the use of antibiotics may aid in the control of leptospirosis in domestic animals, but these methods cannot be applied to leptospiral shedders in wild animal populations. This problem may be approached by two methods; active campaigns to destroy carrier

animals by trapping or shooting, or the destruction of the leptospirae in contaminated soil and water by disinfectant agents. The method used will depend on the circumstances.

In Japan, Tokyama (18) applied calcium cyanamide as a fertilizer to some of the rice-fields in an area where Weil's disease was very common. As a result of this treatment, the number of cases of Weil's disease was markedly reduced. In the United States, Molner and co-workers (19) studied a poultry-dressing establishment in which 18 cases of Weil's disease had occurred. The premises were heavily infested with rats, and the worktables were incompletely cleansed of blood and offal at night. *L. icterohemorrhagiae* was isolated by washing the tables with saline in the morning and injecting this fluid into guinea pigs. When the tables were swabbed with diluted hydrochloric acid in the evening, similar inoculations failed to infect guinea pigs.

Laboratory Animals

Laboratory animals may also serve as a large reservoir of leptospirae. *L. ballum* has commonly been found among laboratory white mice (20), *L. icterohemorrhagiae* among laboratory rats (21), and natural infection with this serotype has occurred among guinea pigs (22). In Europe, *L. grippityphosa* has been isolated from naturally infected hamsters (23). Stoenner (24) has recently reported infection of eight laboratory employees who had close contact with Swiss albino mice which were infected with *L. ballum*. Control of the disease in laboratory animals involves recognizing and destroying the infected animals, or possibly curing urinary shedders by the use of antibiotics.

Conclusion

It may be quite some time before effective control measures are developed for leptospirosis in the United States. At the present time we are just beginning to recognize leptospirosis as a disease of public health importance. Before we can control the disease, its extent must be determined in each locality. More cultural studies must be conducted to determine the sero-

types present. After the serotypes and the animals that are important reservoirs are known, effective control measures can be instituted.

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Summer Session in Health Statistics

A second training program in statistics applied to health sciences will be held from June 18 to August 1, 1959, by the University of Michigan Graduate School of Public Health in cooperation with the accredited schools of public health in the United States.

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What We Know About Alcoholism in Industry

HARRISON M. TRICE, Ph.D.

FAR LESS is known about alcoholism as it affects on-the-job work experiences of the employee who is a problem drinker than is commonly believed. The cost of problem drinking employees to their employers, for example, has sometimes been described as an annual "billion dollar hangover." Significantly higher rates of on-the-job accidents and job absenteeism are attributed to the problem drinker as compared with the rates of nonalcoholic employees.

Evidence to back up these alleged work characteristics is nevertheless quite sparse. The simple truth is that what we do not know about the work experiences and behavior of problem drinking employees greatly exceeds what we do know (1).

There have been some scattered estimates in widely separated companies regarding the cost to the employer of problem drinkers. But these merely suggest that in some job situations such an employee is a costly personnel item while in others he is a relatively minor expense item. Furthermore, his work-related accidents have not been studied in any systematic fashion to discover whether his rate is any higher than that of nonalcoholic employees. Even absenteeism, about which most is assumed to be known, has not been effectively studied with

reference to such variables as job types, job status, and stage in the development of alcoholic disease.

Despite this general lack of substantial data about the work behavior of the employee with a drinking problem, some tentative descriptions of the work experiences of alcoholics can be made with a fair amount of confidence. Moreover, there is a slowly developing body of data that can be labeled "things we know less about" but concerning which some hunches are available, even though there are fewer data to back them up than those experiences we can describe tentatively. In short, we can classify what we know about the industrial aspects of alcoholism into data that give us some reasons to believe they are reliable, and data that are far less reliable, but which nevertheless provide us some basis for hunches.

The fact that early- and middle-stage alcoholics continue to work is the work characteristic on which we probably have the most substantial data. Of some 700 work histories of members of Alcoholics Anonymous I collected, only 4 members reported they did not work regularly during the middle phases of their alcoholism. There seems to be little doubt that the alcoholic works regularly while his malady is in its incipient and middle stages. Typically he continues on his job for years as the symptoms of compulsive drinking develop at a slow but steady pace. He gradually, almost imperceptibly, loses control of his drinking until he comes to the point where, once he begins to drink, he finds it almost impossible to stop voluntarily.

The symptoms of the early and middle stages

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that accompany this loss of control are not the dramatic ones of late-stage alcoholism which most people think of when they hear the term. Consequently, he is unrecognized as an alcoholic and continues to work actively at his job or profession even though he is well along the road to alcoholism. It is this unrecognized, covered-up employee with a drinking problem who constitutes an especially difficult personnel matter for management.

What are some of these early and middle symptoms (2)? Since the alcoholic drinks to experience a sense of physical and emotional well-being, he soon discovers he must drink a lot more than he did a few years before because it takes more liquor to get the same "glow." So he begins to drink everyone under the table, and his friends often observe how well he can "hold his liquor." Thus his consumption increases markedly. So do his periods of temporary amnesia. Dubbed "blackouts" or "pulling blacks," these are not periods of physical unconsciousness. They are drinking episodes during which the developing alcoholic appears to an observer much like any other relatively drunk person. The difference, however, is the inability of the early-stage alcoholic to remember what happened during the drinking episode. At first these blackouts are sporadic, but in a few years they become regular experiences.

During the early period he gains a good deal of prestige among drinking friends for these drinking exploits. His capacity to drink and his inability to remember what happened are often sources of group recognition for him; the feelings of well-being he gets from drinking are reinforced by group rewards. But gradually his drinking friends begin to think of him as different and he does, too. As a result, he develops a series of psychological symptoms.

He begins to hate himself for not having the willpower of others, and he finds in alcohol a temporary relaxation of this self-hate. But upon sobering up, he discovers the self-hate is still there, along with an energy-sapping hangover. So, unlike the nonalcoholic with a hangover, he turns to more alcohol in an effort to manage the twin agonies of emotional remorse and hangover pain. At the same time he begins an intense drive to refute the growing realization that he has a drinking problem.

His excuses for drinking become exaggerated, often bizarre. He vigorously denies there is anything wrong, frequently going to work when in bad physical and emotional condition just to prove it. He often seeks out persons who "drink like I do" in an effort to find a congenial set of friends who will not increase his guilt about his drinking (3).

Efficiency Decline

These symptoms usually have a direct impact on his work efficiency. It seems to be quite clear that the hangover, the self-hate, the preoccupation with denying there is anything wrong, the loss of control that leads to continued drinking off the job until something outside himself intervenes to stop him, and the anxiety about getting alcoholic relief during the workday reduce substantially his ability to do his job.

This decline in efficiency has numerous facets. The problem drinker begins to procrastinate a great deal, to put off everything except absolutely essential tasks, to fulfill only the immediate requirements of his job. He compromises with quality, accepting second or third "best" because he is unable to concentrate on the details necessary to perform his job well (4). A "don't-care" attitude supports the work slowdown. Fatigue saps his energy, and consequently initiative is forgotten. He has a strong tendency to do his job any old way just to get it done. In short, he is content with a mediocre performance. Because he becomes very guilt-ridden about his poor work, typically, he tries to make up for it by spasmodic spurts of output or creativity during which he often does superior work (5). This serves as a sign to him that his work is still well done. Actually it is merely a short-lived increase in a general efficiency decline.

Fairly good data also indicate that problem drinkers are rather evenly distributed through all occupational groups as well as many types of businesses and industries (6). The old stereotype that visualized the unskilled, poorly educated "drunk" as the typical alcoholic is obviously wrong. Company after company has discovered well-developed problem drinkers among their managerial ranks, and the pro-

fessions appear to be proportionally represented in the alcoholic population. In short, it seems that alcoholic employees appear in substantial numbers in managerial, skilled, unskilled, semiskilled, service, clerical, and professional occupations. When the last stages of alcoholism are reached there is some tendency to gravitate toward the migratory, spot-labor jobs, but this is far from a general trend even at this stage.

The middle-stage alcoholics are apparently rather evenly distributed throughout the various types of American industries (7). Construction does not seem to have an unusually low or high number of them in comparison with agriculture or manufacturing. Transportation has substantial numbers, as do finance and service businesses. Government service, including the military, has its quota but, again, not in any unusual concentration.

In addition to this characteristic of dispersion throughout the work world, the middle-stage alcoholic is, in many respects, like any other employee (6). He cannot be distinguished by his length of service, marital status, or mode of residence. Although his drinking deviates from accepted limits, he is still part of established social and economic patterns of living.

The type appears to be lodged heavily among male employees in the ages from 35 to 50 years. Certainly female alcoholics exist, probably many more than are currently estimated, and many more women are in the labor force today than 20 or 30 years ago. There are still good grounds, however, for believing that industry will find more alcoholism among men than women. Even more certain is the characteristic that alcoholism is a disorder of the mature years at a time of maximum work expectancy. If it were spread evenly among workers of all age groups, its industrial impact would be far less. Concentrated as it is in the productive years of 35-50, it can impair a large number of workers at the point of their greatest work contribution.

Company Rehabilitation Efforts

Numerous prominent companies have recognized alcoholism as a health problem, issuing

personnel policies regarding it and setting up specific procedures to carry them out (8). Typically, the policy statements issued (a) indicate that the company regards alcoholism as a form of illness and intends to act accordingly; (b) explain how the company will aid in the rehabilitation of the alcoholic employee; and (c) set the limitations on this aid, that is, the point at which the company will cease to aid in the rehabilitation of such an employee and consider his discharge.

In implementing these policies, various personnel practices have been used. Sickness benefits, pension eligibility, leaves of absence, counseling and referral to outside treatment facilities, and supervisory training relative to the malady have all been offered in various company programs for rehabilitation. However, no one company has used all of these. Most of the programs operate in the belief that rehabilitation does not occur overnight and that recurrence of drinking can be expected. When the employee makes a sincere effort and his "slips" become infrequent, most companies with rehabilitation policies believe there is justification for continuing company aid.

On the other hand, when reasonable aid does not produce or seem to prognosticate any basic change in the drinking pattern, most companies consider termination. Continued aid in rehabilitation under these conditions, they believe, is merely an unwitting support of abnormal drinking and is probably a hindrance rather than an aid to sobriety. Briefly, almost all companies with a treatment policy will, under certain circumstances, discharge an employee because of his drinking. A few companies exhaust all possibilities for every alcoholic, requiring special review before termination. This is especially true for longtime employees.

Extent and Cost to Industry

Data on the extent and cost of alcoholism in business and industry are far less reliable than data on efficiency decline and efforts at rehabilitation. There are grounds only for reasonable guesses. Estimates of the number of employed middle-stage alcoholics have been made in two ways: (a) by taking the estimated number of all alcoholics in the total population and making

an educated guess of the number who are regularly employed, and (b) by using the estimates made in specific companies as an indication of the number throughout industry. Both of these approaches are questionable at best; however, they provide us with a rough idea of the extent of the problem.

Estimates of the total number of alcoholics have come mainly from the Jellinek estimation formula (9), the intricacies of which I will not explain here. It is appropriate, however, to point out that numerous efforts to validate estimates made by the formula have shown considerable success. Thus, an independent survey of the number of alcoholics in a specific locality is compared with an estimation obtained with the formula. In numerous instances the two have agreed closely, leading to the tentative validation of the Jellinek estimations (10).

The chief difficulty with this procedure is that no one knows the accuracy of the independent survey against which the estimates were validated. The survey results may or may not correctly reflect the number of alcoholics in the area. Therefore, one set of questionable estimates may be validated against another set of equally questionable data.

On the other hand, the repeated close agreement between the appraisals made by the formula and independent assessment indicates that the Jellinek estimates are far more than conjecture. Apparently, there is a careful approximation in them that merits close attention. In 1955 the formula estimate was 4,500,000 incipient and full-blown alcoholics in the United States.

But how many of these are employed regularly in a definite job? Here the quest becomes very fuzzy. Most observers have played safe and said only half of these were actively employed. At the same time case histories of clinics and work histories of members of Alcoholics Anonymous suggest a substantially higher number in the employed category. But no one knows how to be more precise in any systematic fashion about the estimation.

The figure usually cited is 2 million, or approximately 3 percent of the Nation's labor force. But a particular company may have many more or many less than this percentage. Judging from studies in individual companies,

this figure can range from practically none to 10 percent (11,12).

But troubles in estimating really start when we try to appraise the costs of alcoholism to American industry and business as a whole. This appears to be not only an almost impossible task but also a gigantic one. When the vast array of factors, both tangible and intangible, affecting the value of an employee to his employer are considered, the difficulty of the task becomes obvious. And, when an effort is made to attach a dollar value to the way in which alcoholism reduces this value, any nationwide effort is extremely questionable. The best we can do is list the various cost factors that may be relevant to a particular company, leaving to the judgment of those who know the organization any actual estimation of dollar cost (13).

First, cost of reduced work efficiency is the most apparent factor. This can take many forms such as scrap, spoilage, errors in assembly and shipping, slowdown, fewer sales, increased rejects, and customer complaints. Executive and professional error adds another and even more costly dimension. Second, since many alcoholics appear to have a substantially higher absenteeism rate, they can be costly from this standpoint. Furthermore, companies make training investments in many employees which are lost if termination for alcoholism occurs, and replacing an employee can be expensive. The public relations impact of an alcoholic employee is also a potential cost item along with the sickness support the company may provide for the many related illnesses that accompany alcoholism.

Briefly, the only meaningful cost items come from specific companies who appraise alcoholic employees in specific jobs and attach a dollar value to their cases. This procedure has been attempted in a few instances, and the results suggest that in many situations problem drinkers are very costly to their employers, while in others the cost is relatively modest (14).

Absenteeism and On-the-Job Accidents

Again, we do not have very much specific information about absenteeism and on-the-job accidents of alcoholics. There are data indicating that, in general, the absenteeism rate of

a company's problem drinkers is significantly higher than that of nonalcoholic workers (15,16). Beyond this we have only hunches. However, these suspicions are interesting.

Some grounds exist for believing that "no-report" absenteeism and "partial" absenteeism characterize a developing drinking problem in an employee (17). Failure to report his inability to be on the job is often a symptom of the middle-stage alcoholic that distinguishes him from the average absentee. In the early stages, a member of his family may report his absence. But as his problem worsens, his absences will occur without advance notice from anyone. Often he comes to the job only to leave before the day is over (18). He realizes he cannot get through the day without a drink, so he leaves. This behavior is most likely in unskilled and semiskilled work which operates on a definite schedule and under close supervision.

There is also some exploratory evidence regarding absenteeism among high-status as contrasted to low-status problem drinkers (19). Alcoholic executives, engineers, lawyers, doctors, and other high-status workers apparently have substantially less actual absenteeism than do low-status alcoholics on semiskilled and unskilled jobs. High-status inebriates, however, seem to have a great deal of "on-the-job absenteeism," that is, they come to work when they feel bad from their drinking behavior, but for all practical purposes are "absent." They put in an appearance but merely go through the motions of doing their jobs. Low-status problem drinkers tend to have large amounts of actual "stay-away absenteeism."

Various motivations and work situations seem to account for this difference. The high-status alcoholics, despite their disorder, were motivated to go to work by a sense of responsibility, a desire to deny there was anything wrong, and as a way to reduce their guilt about excessive drinking. The motivations to go to work anyway were reinforced by the fact that once at work, they could get a drink rather easily when they wanted one. They have freedom from close supervision, freedom of schedule, and freedom to move around. Low-status workers did not express these motiva-

tions nor enjoy these job freedoms, so their actual absenteeism was consequently higher.

Far more contrary to popular belief are notions about the job accidents of the problem drinker. The belief that his accident rate must be higher than that of other workers is widespread. Yet what meager evidence there is suggests no such sharp difference (17,20). Reasons for this evidence to the contrary are numerous. Many jobs involve little exposure to accidents, and safety engineering has removed the dangers from many more. Problem drinkers, scattered throughout all occupational levels, have their share of the safe jobs. Also, the repetitive nature of many jobs and the routine to which an experienced employee reduces his work are a protection to the problem drinker.

Furthermore, an overcautious attitude is part of the problem drinker's defense mechanism. He seems to be overly cautious of job hazards and thus minimizes the chance of accidents. The problem drinker has a keen awareness of alcohol's effect on him and develops a routine for handling it. Finally, two factors act to reduce his actual exposure to accidents. On many days when he believes he is likely to have an accident he resorts to absenteeism; it is impossible for him to have an accident on the job if he isn't there. And, in some instances, fellow workers or a supervisor will see to it that a problem drinker is put on a safe job until he is in better shape to handle a job that exposes him to accidents.

Summary

Although evidence is rather meager, we know the problem drinker is a definite personnel problem for employers. Even though he is only in the middle stages of his malady, not a full-blown, chronic alcoholic, his work efficiency is materially damaged, and often he can be a definite financial liability. Alcoholism in industry is a disorder of the mature years, the time of maximum work expectancy.

Conservative estimates of the number of employees who are alcoholics center around 2 million, and there seems to be good evidence that they are present in substantial numbers in all occupational and industrial groups.

Something is being done for this type of employee. Numerous companies have a definite rehabilitation policy with specific procedures for implementing it. Most companies with a policy concerning treatment will, under certain circumstances, discharge an employee because of his drinking.

The inebriate with a high-status job has more "on-the-job absenteeism" than the low-status worker. There is little evidence that the accident rate for the problem drinker is higher than that of other workers.

A start has been made on developing more accurate data about such work experiences as accidents, absenteeism, and coverup. In short, what we know about the industrial aspects of alcoholism is slowly increasing. Soon we may be able to describe the job aspects of alcoholism more accurately.

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Trichinosis in the United States

IRVING G. KAGAN, Ph.D.

AMONG all the intestinal nematodes, *Trichinella spiralis* has probably made the best adjustment for a parasitic existence. All stages of the life cycle are parasitic. The sexually mature worms reside in the small intestine and produce larvae which invade the musculature and internal organs of the host. A recent study of 55 experimentally infected hogs revealed the following distribution of larvae in the tissues: diaphragm, 100 percent; stomach, 18 percent; testes, 15 percent; liver, 11 percent; brain, lungs, wall of the small intestine, each 9 percent; pancreas and aorta, each 8 percent; and heart, 2 percent (1).

The definitive hosts for this parasite are usually carnivorous mammals, that is, those that eat the flesh and internal organs of infected animals. A survey of 2,433 mammals representing 42 species in Alaska revealed an incidence of infection of 11.7 percent in 23 species (2). Some of the infected hosts were aquatic mammals such as seals and white whales, which are primarily fisheaters, indicating that the epidemiology of *T. spiralis* may involve transfer or transient hosts.

In the United States trichinosis is a disease of man and his domesticated pig as well as a sylvatic disease of many wild animal species. A survey of trichinosis from 1953 to 1955 in Iowa emphasizes the sylvatic nature of this disease. Infected with trichinosis were 14 of 119 rats, 31 of 308 foxes, 1 of 40 opossums, 2

of 29 raccoons, 12 of 85 mink, and 2 of 4 coyotes. Examination of 2,184 pigs revealed 1 infection, and 18 of 1,148 pork products contained trichina larvae (3). In the arctic areas the polar bear, dog, and wolf are heavily infected.

The incidence of trichinosis in the American population is not accurately known today. Gould believes that a conservative estimate would place the figure at about 16 percent. But in a postscript he states that the incidence is probably more than double this amount (4,5). This means that 25 to 50 million Americans carry trichina larvae in their muscles and internal organs. A majority of these infections are symptomless and subclinical. Although most States do not make trichinosis a reportable disease, between 200 and 300 cases are reported each year to the Public Health Service. These are the recognized cases. Clinically, trichinosis has all the earmarks of so many other diseases that in all probability a large number of cases go undiagnosed. The mortality rate for recognized clinical cases was, approximately 5 percent in the United States (4,5).

The epidemiology of this disease is very well understood. We know how it is transmitted to man, and we know how to prevent its spread in the swine population. We are improving serologic diagnosis in the suspected patient and have made important advances in the treatment of the disease with ACTH and cortisone. In recent years two comprehensive national conferences on trichinosis were held in Chicago, the first in December 1952 and the second in March 1954. The many facets of the control of this disease were adequately covered in the papers presented at these meetings. In this paper I shall outline the problem and review

Dr. Kagan, chief of the Helminthology Unit, Communicable Disease Center, Public Health Service, Atlanta, Ga., presented this paper at the CDC Conference for Teachers of Veterinary Public Health and Preventive Medicine, and Public Health Workers, Atlanta, June 12-18, 1958.

some of the contributions that have been made since those meetings.

Control Measures

Trichinosis in the United States is perpetuated in a very small proportion, 0.63 percent, of the swine population through the feeding of infected scraps of pork collected in garbage (6). As of May 31, 1957, the Animal Disease Eradication Division of the U. S. Agricultural Research Service reports that 12,423 farms were feeding garbage in one form or another to swine. Hundreds of communities in the United States sell their garbage and use the funds for civic purposes. It is generally conceded that the prohibition of garbage feeding would drastically cut the incidence of trichinosis in the domesticated pig, but it would probably not eradicate the parasite because of the sylvatic incidence of trichinosis in rats and other scavenging species. The lone infected pig in the Iowa survey (3) may well have acquired trichinae by eating a dead infected animal on the farm.

Since a \$50 million industry, the collection and use of garbage for swine production, involving approximately 35 percent of the communities of the United States, probably cannot be legislated out of existence, attention has been directed toward another measure, the sterilization of garbage by cooking (7). Every State has some type of law or regulation which prohibits the feeding of raw garbage to swine. Garbage cooked at 100° C. for 30 minutes is freed of living trichina larvae. Approximately 11,747, 94.5 percent, of the 12,423 premises feeding garbage to hogs, report that they are feeding cooked garbage. This salutary situation with respect to the use of cooked garbage was engendered mainly by the necessity of preventing the spread of garbage-borne epidemic disease of pigs, such as hog cholera, vesicular exanthema, foot-and-mouth disease, salmonellosis, tuberculosis, swine erysipelas, and brucellosis. Because of noncompliance by some farmers, the lack of adequate inspection facilities by some State agencies, and the expense of cooking garbage, the control of trichinosis by this method has not been completely successful. Continued education, research, and law en-

forcement by State and Federal officials will do much to strengthen this very effective method of trichina control.

Inspection of pork products constitutes another means of control. The Federal Government requires that "the respective States allow the sale of garbage-fed hogs for slaughter only at a federally inspected plant or plant having equivalent inspection." In some countries tissue press preparations of each carcass are carefully inspected microscopically for the presence of trichina larvae. In Chile a staff of 22 persons is necessary to process and examine 1,000 pigs a day: 8 trichinoscopists, 4 sample collectors, and 10 assistants preparing 8 slides from each carcass for examination (8). It is estimated that an effective program of microscopic inspection in the United States would cost more than \$40 million (9). For this and other reasons, the microscopic examination of pork has not become a routine procedure in our country.

The freezing of pork is also advocated for killing trichina larvae in infected carcasses. As early as 1914, research by the U. S. Bureau of Animal Industry indicated that refrigeration of pork at -15° C. (5° F.) for 20 days is an effective safeguard against trichinosis in man (10). These studies were the basis for the present practice of holding pork and pork products customarily eaten without cooking by the consumer for 20 days at 5° F., 10 days at -10° F., or 6 days at -20° F. In Canada pork is held at -15° C. for 3 weeks in sealed storage lockers inspected by the government (11). Quick freezing at temperatures of -37° C. (-34.6° F.) kills trichina larvae in 2 minutes. In the United States today meat packing plants do not have the space to freeze and store the huge volume of pork processed. The cost to the consumer for freezing pork would be approximately 5 cents per pound. This economic factor plus consumer resistance to the purchase of pork that has been frozen and thawed make this type of control impractical and difficult to initiate (12).

Sterilization of carcasses by irradiation has been carefully investigated by Gould and his co-workers (13). These workers have estimated that facilities using cesium-137 as the source of radiation, costing in excess of \$500,000, can

effectively treat carcasses with 30,000 roentgens, enough radiation to make the larvae incapable of completing their life cycle in the host. The cost to the consumer is estimated at 0.23 cents per pound, and the meat is said to be unaltered, healthful, and palatable.

The most effective and the cheapest control method is the thorough cooking of pork by the consumer. If they were aware of the hazards, many persons would not eat uncooked pork or pork products that have been smoked and not adequately heated prior to processing. Informing the producer on the farm about the dangers of feeding raw garbage to his swine and alerting the housewife, food handler, restaurant owner, and others to the dangers of eating pork not thoroughly cooked are among the control measures recommended by previous conferences on trichinosis. But it should be reiterated that placing the responsibility for control of trichinosis on the consumer is not the most efficient method for controlling the disease.

Treatment and Diagnosis

One aspect of the epidemiology of trichinosis should be emphasized. Eradication cannot be accomplished solely by control measures initiated by the large farmer or food processor. A number of trichinosis outbreaks have been traced to pork products that did not pass through federally inspected plants (14). The small farmer with a few pigs which are fed table scraps (uncooked garbage) and butchered in local abattoirs account for some of the incidence of trichinosis in the United States.

Since so many trichina infections are subclinical, the question has been raised regarding the necessity of any kind of control. Magath and Thompson believe that persons infected with small numbers of trichina larvae have an acquired immunity which would be destroyed were the disease controlled (15). From a public health point of view such a position is untenable. We must strive for the control of all communicable diseases. There is also to be considered another facet of this complex problem that has received very little attention—the evaluation of the deleterious effects of a subclinical infection in an individual. In the rat, infection with trichina larvae reduces the work-

ing ability of the animal 49 to 60 percent. Weight loss induced by exercise is 150 to 170 percent greater than in the controls (16).

Little attention has been directed toward the use of long-lasting, broad-spectrum chemotherapeutic agents administered in the feed to eliminate *T. spiralis* adults and other intestinal roundworms in swine. In mice, medicated feed containing 0.15 percent cadmium oxide produced a striking reduction in the number of adults and larvae harbored by infected animals (17).

The use of a skin test for the diagnosis of infection in pigs has not received much attention in recent years. Soulsby skin-tested animals in England and reported cross-reactions with *Ascaris* infections (18). With the application of newer immunochemical techniques, specific antigens could be prepared for this purpose.

Two flocculation serologic procedures are available for the diagnosis of trichinosis: the method of Sussenguth and Kline (19), utilizing cholesterol particles, and the bentonite technique of Bozicevich and others (20). The Helminthology Unit at the Communicable Disease Center uses the bentonite flocculation test for the diagnosis of trichinosis. We have found this method effective in detecting antibody during acute infections in man and animals. In an experiment with experimentally infected hogs, flocculating antibody was detected from the second to the sixth week of infection in all animals. After the ninth week antibody could no longer be determined (21). As a method of diagnosing active infection, the bentonite technique is excellent, but, for the detection of chronic infections, it does not compare with the technique of Sussenguth and Kline. These workers reported that antibody may be detected in infected hogs 1 year after infection (19). Utilization of a rapid serologic technique for the detection of infected animals prior to slaughter might under some circumstances be a useful control procedure.

Conclusion

To be successful, any control program for trichinosis must not conflict with the economics of pork production on the farm or at the proc-

essing plant. The control of trichinosis has benefited more from the measures taken to control vesicular exanthema than from all the recommendations made for the helminth disease. This is heartening because any measure taken against the spread of a garbage-borne virus disease will benefit a helminth garbage-borne disease. Although it may never be economically feasible to quick-freeze all pork in order to kill trichina larvae, the storage of pork in freezing compartments of refrigerators and home freezers is doing much to lower the incidence of trichinosis in our country (12).

In the not too distant future, we will have to come to grips with the control of this disease. Control will come when the American people are willing to pay the price of consuming trichina-free pork. Until that time the scientific community must continue working on more efficient methods of control and on instructing the public in methods of protecting its health and well-being.

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Synchronizing the Roles Of State Agencies For Traffic Safety

ALBERT L. CHAPMAN, M.D.

SEVERAL years ago I began talking to State and local health workers about traffic accidents and their prevention. There appeared to be a consensus that traditionally this was the business of police officials and traffic administrators.

But when I asked the State motor vehicle administrator of a heavily populated eastern seaboard State whether he thought public health workers had a role to play in traffic safety, his answer was direct and very much to the point. This was the gist of his reply:

"The problem of traffic accidents is so great, we traffic administrators need all the help we can get. We can't take a high-risk driver off the road until there is scientific proof that he is a high-risk driver. We seldom have that proof. We need it badly. At least in the case of drivers with chronic illnesses and disabilities, it would be helpful to have the cooperation of the public health and medical professions in evaluating the degree of risk involved in giving a license to a driver who has such a disease as diabetes, heart disease, or epilepsy."

He quickly pointed out, however, and I believe rightfully, that "motor vehicle administrators and police officials did not want health people trying to run the show."

In short, there is a role for public health workers and physicians in traffic accident prevention . . . and an important role.

In the spring of this year, Dr. James L. Goddard, chief of the Accident Prevention Program in the Division of Special Health Services, Pub-

Dr. Chapman, an Assistant Surgeon General and chief of the Division of Special Health Services of the Public Health Service, presented this paper at the meeting of the Association of State and Territorial Health Officers in Washington, D. C., on October 23, 1958.

lic Health Service, working closely and cooperatively with Basil R. Creighton, assistant executive director of the American Association of Motor Vehicle Administrators, arranged for a 2-day conference between 8 State health officers and 8 State motor vehicle administrators and a few other officials.

It was a very successful conference. Almost within minutes it was realized that State health officers had remained aloof from the problem of traffic accidents in many States on the mistaken assumption that they had no stake in them. And the traffic administrators realized that there were many types of help that they could have obtained if they had sought the assistance of State health departments. Never before have I attended a conference in which two previously unacquainted groups of people worked so single-mindedly toward a common objective.

Because of this singleness of purpose some very constructive recommendations stemmed from the conference. It was suggested, for example, that the relationship of the two agencies in each State be explored by the Public Health Service and that a report of the findings be made available to the American Association of Motor Vehicle Administrators and to the Association of State and Territorial Health Officers.

A sample of some of the facts gleaned from this report shows current participation by State health officers in traffic safety and indicates ways in which they may be able to contribute further.

- State health departments hold membership on only 23 of the 42 governor's committees on traffic safety.

- In only 4 States are cases of diabetes and epilepsy reported by physicians to State health departments. In only 7 States do physicians report cases of these diseases to the State motor vehicle administrator.

- In only 1 State are mental patients reported to the State health department, and in only 10 States are such reports received directly by State motor vehicle administrators.

- Death certificates are sent to motor vehicle administrators by State health departments in 15 States, so that licenses are no longer recorded in the name of dead people.

- In 17 States, cooperative studies are being conducted by the State health department and the State motor vehicle agency. In 12 of these

States these cooperative studies are associated with the Cornell Automotive Crash Injury Research.

Suggestions for improving cooperation between State health departments and motor vehicle administrators follow.

Driver Licensing

The responsibility for advising State motor vehicle administrators concerning criteria that can be used to limit the driving privileges of persons who are suffering from diseases that may make them high-risk drivers is clearly a medical responsibility in which the entire medical profession must share. The State health department is the logical medium for bringing the State medical association and private physicians actively into the picture.

The weighing of the merits of reporting patients with diabetes, epilepsy, and heart disease to motor vehicle agencies is not a responsibility that should be sidestepped by the medical profession. As in all other problems involving doctor-patient relationships, there are two sides to this question. But serious consideration should be given to the merits of this activity by State health departments and medical societies.

Communication

Whether communication between the State health officer and the State motor vehicle administrator is established and maintained via a governor's traffic safety committee, frequent informal meetings between representatives of the two agencies, a system of regular, frequent exchange of reports, or through working together in cooperative studies, great improvement in the quality as well as the quantity of communication is essential.

Research

Epidemiology long has been considered the domain of health departments. As long as so little is known about the personal factors that contribute so substantially to traffic accidents, it would seem reasonable to expect most State health departments to follow the lead of the New York State Health Department, the California State Health Department, and others in

devising, conducting, and supporting epidemiological studies that can give us some of the many answers we now lack concerning driver accident susceptibility. And finally, there remains this question, which State health department personnel, physicians, police officials, and motor vehicle administrators will have to find the answer to: When you have identified the high-risk driver, how do you get him off the road?

Education

There are many facts known to science which, if communicated successfully to the driving public, could reduce the toll of traffic accidents. For example, facts about:

- The effects of drugs, such as the antihistamines, on driving ability.
- The effect of alcohol on reflexes and judgment.
- The effect of fatigue on reaction time.

In addition, there is a vast field ripe for study and investigation by medical and paramedical personnel:

- The effect of emotions on driving ability.
- The personality pattern of chronic traffic violators.
- The motivations of persons who drive in an irresponsible fashion.

The modern American car, although not perfect from the standpoint of safety design, is still a miracle of scientific achievement. Relatively few accidents occur primarily because of mechanical faults or failures.

This cannot be said of American drivers. Almost anyone is permitted to drive a car today under any and all conditions. While our scientists have been busy harnessing the atom, and medical scientists have been successfully confining once epidemic diseases such as malaria and poliomyelitis, relatively little time, money, or attention has been spent in determining the basic reasons why 40,000 Americans are killed by automobiles each year.

To me, all of this is a challenge which has been inexcusably evaded by the rank and file of the public health and medical professions for several decades. The question now is: What are we going to do about it?

Spontaneous Diseases and Their Control in Laboratory Animals

ROBERT T. HABERMANN, D.V.M.

THE NEED for laboratory animals that are free from spontaneous or naturally occurring diseases is being recognized by research workers throughout the United States. Laboratory animals with parasitic, bacterial, and viral diseases make poor experimental animals, produce inferior biological products, and markedly increase the cost of research. Moreover, diseased animals should not be used in research, especially in radiation, nutrition, and blood studies, because the normal physiological reactions or blood counts are not obtained from them. Researchers know that the results of experiments are reliable, trustworthy, and repeatable only if disease-free animals are used.

During the past 10 years, the Comparative Pathology Section and the Animal Production Section of the National Institutes of Health, Public Health Service, have investigated some of the diseases occurring naturally in mice, rats, guinea pigs, rabbits, and hamsters. The purpose of these investigations was to determine the diseases most injurious to these animals and to evaluate some of the methods of disease control and eradication.

External and Internal Parasites

External parasites cause or transmit some inflammatory skin disorders and parasitic and bacterial diseases in laboratory animals. Alopecia and dermatitis may be caused by the biting and sucking of lice, fleas, and bedbugs or by the burrowing of some species of mites. Eperythrozoonosis, transmitted by the mouse louse *Polyplax serrata*, produces a mild anemia in

mice. It is caused by *Eperythrozoon coccoides*, a gram-negative, disk-shaped organism that occurs in the plasma and on the red blood cells. The rat louse *Polyplax spinulosa* transmits bartonellosis, caused by rod and coccoid-shaped organisms, *Bartonella muris*. They produce a severe anemia in splenectomized rats.

The intermediate or larval stage of the tapeworm *Hymenolepis nana* is transmitted to mice and rats by ingestion of fleas and meal beetles.

To eliminate these external parasites and control insectborne diseases, we used an insecticide consisting of 0.1 percent gamma benzene hexachloride, 2.0 percent methoxychlor, and 97.9 percent talc. The animal care workers at the National Institutes of Health have used more than a ton of this insecticide, and no deleterious effects due to the medicated powder have been reported.

Benzyl benzoate is effective in treating and controlling ear mange, or ear canker, a common parasitic infestation of rabbits. This inflammatory condition, usually confined to the external ear, is caused by a mite, *Psoroptes cuniculi*.

Diarrhea and death in young rabbits are frequently caused by two species of coccidia.

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Eimeria perforans causes intestinal coccidiosis and *Eimeria stiedae*, hepatic coccidiosis. We eliminated these two protozoan diseases from the rabbit colony by screening for infection through saltfloatation fecal examinations and either removing the infected animals from the colony or giving them a saturated solution of sulfaguanidine in their drinking water for a 2-week period. Sanitation and the washing of all green vegetables are also important preventive measures. Since April 1955, after these procedures were adopted, only 12 positive coccidial fecal samples have been obtained in more than 1,400 examinations.

Tapeworms *H. nana* and *Hymenolepis diminuta* are the two common cestodes found in mice and rats. Treating groups of animals by adding 50 mg. of lead arsenate to 20 gm. of ground mouse feed and 100 mg. of the drug to 20 gm. of ground rat feed is effective. Culbertson (1) reports that 10 mg. of atabrine by mouth for 2 successive days is also effective.

The oxyurids, or pinworms, of mice and rats are *Syphacia obvelata* and *Aspicularis tetraptera*. These worms occur in the cecum and colon and produce a catarrhal enteritis when present in large numbers. A dose-rate per mouse of 40 mg. of piperazine adipate in 10 cc. of drinking water and a dose-rate per rat of 250 mg. in 50 cc. of water for 3 days for both mice and rats was found to be 95 percent effective in removing oxyurids from mature animals. Females and their litters should be re-treated in 30 days to remove pinworms from unweaned mice that were unable to drink the medicated water.

Although no critical anthelmintic tests have been run, we believe that the piperazine compounds would also be effective in removing the roundworm *Paraspidodera uncinata* from guinea pigs and the pinworm *Passalurus ambiguus* from rabbits.

The larval forms of the tapeworms of the dog and cat are occasionally encountered in laboratory animals. *Cysticercus fasciolaris*, the larval stage of *Taenia taeniaeformis*, the tapeworm of the cat, appears in the livers of mice and rats. *Cysticercus pisiformis*, the larval stage of *Taenia pisiformis*, the tapeworm of the dog, is attached to the mesentery of rabbits.

Protozoa which may cause diarrhea and catarrhal enteritis are *Balantidium cavae*, a ciliated protozoan occasionally found in the colon of the guinea pig, and *Trichomonas* spp. and *Giardia* spp., frequently found in the cecum and colon of the hamster.

Salmonellosis

In the absence of an effective vaccine or therapeutic agent for the control of salmonellosis, research workers must rely on strict sanitation and general preventive measures to avoid the introduction and spread of this disease in laboratory animals. Prior to 1954, *Salmonella* spp. were frequently isolated from the organs and feces of the laboratory animals at the National Institutes of Health. In 1954, approximately 38,000 mice were screened and examined for salmonellae by bacteriological examination of composite fecal samples using the procedures outlined by Galton (2). In 1956 no salmonellae were isolated from the fecal samples of 2,800 mice, 1,000 rats, 800 guinea pigs, 1,200 rabbits, and 200 hamsters. During the same period in 1956 salmonellae were isolated from 25 monkeys (14.1 percent) of 177 in the colony. In 1957 salmonellosis was not observed in necropsies of more than 4,000 laboratory animals.

That year bacteriological examinations for *Salmonella* spp. were run on 780 samples taken from unopened bags of animal feed and 125 samples of sawdust used by the Animal Production Section. In 375 samples of mouse and rat feed *Salmonella kentucky* (identified by Dr. P. R. Edwards) was isolated from 1 sample; *Escherichia coli* from 7; coliform organisms from 77; paracolon bacilli from 14.

No salmonellae were isolated from 375 samples of the guinea pig and rabbit feed, but *E. coli* was found in 9 samples, coliform organisms in 6, paracolon bacilli in 1.

Organisms isolated from sawdust were *E. coli* from 25 samples, coliform types from 42, and paracolon bacilli from 8.

No organisms were found in samples of heated feed: 9 samples of dog feed, 6 of monkey biscuits, 3 of guinea pig pellets, and 12 of dog chow. These examinations showed that although salmonellae were isolated only once

from the unheated animal feed, fecal contaminated feed and sawdust are possible sources of salmonellosis in an animal colony.

Chronic Respiratory Disease

Chronic respiratory disease, the infection most injurious to laboratory rats, is prevalent in all rat colonies unless disease-free animals have been obtained from outside sources. Early lesions from the naturally occurring disease are seen in 3-month-old rats, and, as the animals get older, the lesions become more extensive.

In most rat colonies approximately 70 percent of the animals past 1 year show rhinitis, middle ear infections, bronchiectasis, and abscesses of the lung. Nelson and King (3,4) have reported that infectious catarrh and middle ear infection are caused by pleuropneumonia-like organisms (PPLO) and *Streptobacillus moniliformis*, and that the etiological

agent of endemic pneumonia is a filtrable virus (5).

In October 1955, we began a long-term experiment to study methods of control and treatment of chronic respiratory disease in rats. Eighteen female and nine male rats were selected from three 60-day-old litters. These animals were divided into 3 groups, each containing 6 females and 3 males. One group was offered chlortetracycline at the rate of 5 mg. per 20 gm. of feed daily; the second group, 5 mg. of sulfamerazine per 20 gm. of feed daily; and the third group, 20 gm. of unmedicated ground feed daily. Necropsies and histopathological examinations were conducted on the original 27 rats and the 5- to 11-month-old progeny through the fifth generation, a total of 175 animals.

At necropsy, the animals in each group were examined for exudates in the nasal passages and middle ears and for involvement of lung lobes. Exudates from the nasal passages, middle ears,

Treatment of chronic respiratory disease in rats

Groups of animals	Number animals	Duration of exposure (months)	Number of animals with lesions		
			Peribronchial infiltration	Bronchiectasis	Areas of consolidation in lungs
Original breeders:					
Control.....	9	8	5	2	2
Chlortetracycline.....	9	9	7	0	0
Sulfamerazine.....	9	8½	7	1	1
F1 generation:					
Control.....	11	7	9	0	0
Chlortetracycline.....	12	9	10	0	0
Sulfamerazine.....	16	9½	3	0	0
F2 generation:					
Control.....	21	7	9	0	0
Chlortetracycline.....	13	7	5	0	0
Sulfamerazine.....	14	7	2	0	0
F3 generation:					
Control.....	5	6	1	0	0
Chlortetracycline.....	9	9	1	0	0
Sulfamerazine.....	5	11	0	0	0
F4 generation:					
Control.....	7	7	6	0	0
Chlortetracycline.....	6	6	6	0	0
Sulfamerazine.....	4	7½	0	0	0
F5 generation:					
Control.....	7	7½	(1)	0	0
Chlortetracycline.....	4	7½	(1)	0	0
Sulfamerazine.....	14	7½	(1)	0	0

¹ Microscopic results not completed.

NOTE: The control group received 20 grams of unmedicated feed daily; the second group received a daily dose of 5 mg. of chlortetracycline per 20 grams of feed, and the third group 5 mg. of sulfamerazine.

and from lung lesions were collected, gram-stained films of exudates were made, serum agar plates were inoculated, and disease-free mice were inoculated with the suspension of the exudates, according to the procedures outlined by Nelson (5).

The table shows the results of the necropsy findings from the 27 original animals and their 148 progeny. Each group of the original breeders showed very little improvement from the treatment. The control group contained 2 rats with areas of consolidation and bronchiectasis. In the sulfamerazine group, 1 animal showed bronchiectasis and consolidation of the lung, and the chlortetracycline group contained 7 rats with small areas of bronchiectasis.

The 6- to 11-month old F3 and F4 generation animals, with 9 to 15 rats in each group of the combined generations, showed remarkable improvement. There were no abscesses or areas of consolidation in the lungs of any of the animals. However, in the control and chlortetracycline groups, exudates were present in the nasal passages of 12 rats and in the middle ears of 15 rats. PPLO were isolated from the exudates of the nasal passages of 1 rat and from exudates of the middle ears of 5 in these two groups. No exudates were present in the nasal passages or in the middle ears of the rats fed the sulfamerazine.

In 10 mice inoculated with exudates from the control group of rats, 3 had exudates in the nasal passages and 3 had pneumonia. Of 10 mice inoculated with exudates from the chlortetracycline group, 5 had exudates in the nasal passages, and 3 had pneumonia. The 10 mice exposed to nasal passage and middle ear washings from the sulfamerazine group had no exudates in the nasal passages or middle ears and no gross or microscopic lesions in the lungs. Seven of these mice showed clumps of macrophages in some of the alveoli.

In the F5 generation, the 14 rats in the sulfamerazine group again showed no exudates or lung lesions, while exudates were seen and PPLO were cultured from the nasal passages of the control and chlortetracycline groups of animals.

Histopathological examinations of the lungs of mice that were inoculated with nasal and

middle ear washings and emulsions of lung tissue from the three groups of F5 generation rats revealed bronchial pneumonia in each group of mice except those inoculated with washings or tissues from the sulfamerazine group of rats. No gross or microscopic evidence of toxicity or deleterious effects on any of the organs or on reproduction were seen in any of the animals.

In this experiment, sulfamerazine given daily in the feed eliminated rhinitis, middle ear infection, and endemic pneumonia in the 3d, 4th, and 5th generations of rats. Giving the drug at a daily dose rate of 5 mg. in 20 gm. of ground rat feed may be a good, practical way to obtain a rat colony free of chronic respiratory disease.

Other Bacterial and Viral Diseases

Endemic pneumonia, frequent in mouse colonies, is a contagious disease producing high morbidity and mortality. Preliminary tests indicate that the infection may be treated by offering 1.0 mg. of chlortetracycline daily in drinking water.

Epidemic diarrheal disease of suckling mice is of major concern to mouse breeders, since losses from it are as high as 70 percent and the production of mice is markedly reduced. Research workers are often forced to discontinue tests because of outbreaks of infant diarrhea. The disease occurs in mice 2- to 15-days old; older mice and nursing females are immune.

The symptoms, epidemiology, and transmissibility of the disease were reported in 1947 (6), and intranuclear and cytoplasmic inclusion bodies in the superficial epithelial cells of the small intestines have been described (7). Kraft transmitted infant diarrhea in suckling CFW mice by feeding crude and filtered intestinal contents from infected mice and noted cage-to-cage infections which she attributed to airborne or fly transmission (8).

In 1957, we infected 3- to 4-day-old mice through 10 serial passages with oral and intranasal suspensions of intestinal filtrates from mice with infant diarrhea. Ten serial transmissions of the infant diarrhea virus were also made on Chang liver tissue culture media. Infected Chang liver culture fluid from the second passage of the virus produced diarrhea in

7- to 10-day-old mice exposed intranasally. No chemotherapeutic treatment or other preventive measures have been effective in controlling this disease.

Snuffles and mucoid enteritis cause considerable losses of rabbits each year. Snuffles is a highly contagious respiratory disease, reported to be caused by *Pasteurella lepusseptica* and *Haemophilus bronchisepticus*. However, we have been unable to reproduce this disease experimentally in susceptible young rabbits. Chemotherapeutic treatments have been unsuccessful in the treatment of this disease.

Mucoid enteritis, which affects rabbits 5- to 7-weeks old, is responsible for losses up to 70 percent in some colonies. Its cause is unknown, but Templeton (9) has attributed it to hereditary or nutritional factors. He reported that chlortetracycline and vitamin B₁₂ in feed reduced sickness and losses.

The disease most serious and injurious to guinea pigs is lymphadenitis, caused by streptococci type C. The guinea pig colonies of the Animal Production Section have been free of lymphadenitis since 1954. They were established and expanded from a small group of animals which were kept under strict methods of isolation and sanitation.

Salivary gland disease is a viral disease in guinea pigs recognized by the cytomegalic intranuclear inclusion bodies in the ductal epithelial cells of the submaxillary gland. We have been able to transmit this disease serially in young, pregnant guinea pigs and have produced death and abortion in the experimental animals. However, we have not been able to show that this disease occurring naturally is injurious or causes pregnancy toxemia.

Pregnancy toxemia is thought to be a viral disease of guinea pigs which is recognized by abortion during the latter part of the gestation period and death of the mother during abortion or a day or two after parturition. No treatment is known for it.

Diseases of unknown etiology occurring in laboratory animals are periarteritis in rats, calcium deficiency in guinea pigs, and amyloi-

dosis in hamsters. No methods of control or treatment for these diseases have been reported.

Neoplasms are frequently seen in aged mice, rats, and guinea pigs, but seem to be infrequent in rabbits and hamsters.

Conclusion

The external and internal parasites and the bacterial and viral diseases cause enormous losses of laboratory animals and markedly increase the cost of research. These losses from diseases can be reduced considerably and the number of disease-free animals available for use in forming animal colonies can be markedly increased by good animal husbandry practices and sanitation, and by the development of effective methods of treatment and control.

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After sketching briefly the development of military preventive medicine in the U. S. Army, Dr. Whayne discusses the preventive medicine volumes of the official history of the U. S. Army Medical Department in World War II and points out their usefulness in civilian public health and preventive medicine.

The History of Preventive Medicine in World War II

TOM F. WHAYNE, M.D., Dr.P.H.

WHEN Sir William Osler, soon after the turn of the century, said that preventive medicine is the medicine of tomorrow, he was looking far ahead. He was to live through one world war, and when he died, the year after it ended, it was still regarded as the war to end all wars. He could not foresee the time, a quarter of a century later, when, in the stresses of a global war, all the knowledge of civilian experts in public health and preventive medicine would be pooled with that of medicomilitary experts to make history in these fields at home and in the far corners of the earth.

Modern advances in both military and civilian preventive medicine and public health grew out of the shocking morbidity and mortality of typhoid fever in the Spanish-American War and the challenge of yellow fever and malaria soon afterward. There was close cooperation in those days between Brig. Gen. George M. Sternberg and his group at the Army Medical School and the group on the Johns Hopkins Medical School faculty headed by William H. Welch. The cooperation was so close, in fact,

that it would be hard to separate the military and civilian contributions of those years. Fortunately, this is not necessary. There was glory enough for all. Fortunately, too, there were young men like Maj. Walter Reed, who were eager to accept the challenge of the times and to use the new tools, the most useful of which was, and still is, field investigation using epidemiological techniques.

Although preventive medicine still had far to go when World War I began, the developments which had already occurred and the functional organization of resources and personnel accounted for a brilliant record of achievement, seriously marred only by the devastating epidemic of influenza in the fall of 1918. Epidemiological techniques, field investigations, combined epidemiological-laboratory teams for the expeditious evaluation of disease outbreaks and a focal attack upon them, methods developed for the control of the environment—these were far-reaching developments which have solved many a medicomilitary and civilian problem since.

At the beginning of World War II, Brig. Gen. James Stephens Simmons, outstanding in a group of outstanding preventive medicine and public health specialists in the Office of the Army Surgeon General, was selected to plan,

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develop, and administer the Army program in these fields. He was an admirable choice. He had inherited the traditions of Sternberg and Reed. He had served under Gorgas. He was a recognized authority in epidemiology, the laboratory sciences, and tropical medicine. He had worked closely, in an aura of warm personal friendships, with civilian experts in his own and other fields.

General Simmons was one of the somewhat limited group who appreciated from the beginning the global nature of World War II. He built up a flexible, practical, and highly effective military organization. He had the foresight to plan a medical intelligence organization which provided essential, global information on health hazards and conditions. His greatest contribution, however, was the forging of civilian and military experts into a homogeneous, cordial, and productive working relationship. The stimulus thus provided for cooperative endeavors was among the most precious commodities to come out of the war. By their joint efforts, these groups solved medical problems in environments ranging from the Arctic to the tropical lands of Africa and the far islands of the Pacific. The Army Epidemiological Board and the United States of America Typhus Commission, whose published reports fill a 3-foot shelf, were General Simmons' concept.

History of World War II

Medical military history, in the formalized modern sense, began with the publication, only 2 years after the end of hostilities, of the story of the Crimean War. This history was written because Andrew Smith, director general of the British Army Medical Service, found himself, on assuming his task, with "a complete absence of all details of previous wars calculated to instruct," and he determined that no successor of his should ever again find himself in that situation. In spite of the wide differences in the circumstances of the two wars, these volumes on the Crimean War, as Surgeon Joseph J. Woodward said, "gave direction" to the efforts of the U. S. Army Medical Department in the Civil War. Brig. Gen. Frank W. Weed, editor in chief of the Medical Department history of World War I, wrote later that if there had

existed during the Civil War a dependable record of earlier wars in this country, epidemics might have been foreseen, even in those pre-epidemiology days, and diarrheas prevented.

The volumes that make up the series entitled "Medical Department, United States Army, in World War II" are part of a total series of about 125 (proposed) volumes dealing with all aspects of the war in all theaters in which it was fought. The Medical Department series will eventually consist of about 50 volumes. One volume, in the surgical series, was published in 1952. Since the fall of 1955, there also have been published, exclusive of the preventive medicine volumes, 1 (of 8 scheduled) administrative volume; 6 (of 15 scheduled) surgical volumes; and a dental volume and a volume on cold injury (in a series of 8 scheduled volumes on various other subjects). It is hoped that all the medical volumes can be completed by the end of 1961.

Preventive Medicine Volumes

When the preventive medicine series of this history was planned, General Simmons was selected as chairman of the advisory editorial board, a position which he filled brilliantly until his death in 1954. His work was then taken over by Brig. Gen. Stanhope Bayne-Jones (Ret.), who has served with equal wisdom and competence.

The advisory editorial board set up under General Simmons consists of men distinguished in the field of preventive medicine, all of whom were in service, in positions of responsibility, at home or overseas. They developed the outline for the history and selected the authors and reviewers for the various chapters. With great wisdom, they selected the authors from among men who had "been there," who understood administrative and other military problems as well as epidemiological and other preventive medicine problems, and who could relate both to the environment in which these problems arose.

Of the 8 volumes proposed in this series, 3 have already been published. One dealing with environmental hygiene and another with personal health measures and immunization were published in 1955. One of the three vol-

umes on communicable diseases was published in 1958; another will appear in 1959. The remaining volumes will cover the organization and operation of the program; malaria and other anthropod-borne diseases; civil health problems; and education, laboratories, and training.

The volume on environmental hygiene relates how sanitarians, entomologists, engineers, and physicians maintained standards of sanitation in areas of endemic disease and in the midst of destroyed water and waste disposal systems, or how they set up these systems in areas in which they had never existed. The subjects covered include food management, housing, water purification, waste disposal, insect control, rodent control, the research background of these programs, foreign quarantine, and preventive medicine in ports of embarkation and for persons in transit.

The story told in this book is impressive. Plague was not reported in U. S. Army personnel during the war. No plague-infecting rodent was recovered from a United States military vessel or aircraft. Only 13 cases of cholera were reported during the whole war, and only 102 cases of louseborne typhus, only 1 of which was fatal. There were no cases of yellow fever.

Subjects covered in the volume on personal health measures and immunization include the selection of manpower and the lessons learned from the physical and mental defects thus revealed, personal hygiene, clothing, malnutrition and deficiency diseases, preventive psychiatry, accidental trauma, and the Army immunization program. The tetanus program is typical of the success of many of these measures. Only 12 cases were recorded in the whole Army, and 6 of these were in personnel who had never been immunized.

During World War II, almost 33,000 deaths overseas were caused by nonbattle injuries. More realistically, nonbattle trauma was the cause of 1 in every 5 notifications of death sent to the family of a United States soldier. This is a problem which has existed since the Revolutionary War and which has increased in gravity as mechanization of the Armed Forces has increased. It is also, as a British military ophthalmologist forthrightly put it, augmented by "the stupidities of fools." As the

Availability of Volumes

Upon publication the preventive medicine volumes in the history of the Medical Department, United States Army, in World War II are placed on sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C. The following are now available:

Environmental Hygiene, vol. 2, 1955, 404 pp., \$3.50.

Personal Health Measures and Immunization, vol. 3, 1955, 394 pp., \$3.25.

Communicable Disease, vol. 4, 1958, 544 pp., \$5.50.

war ended, it was outstandingly demonstrated that there was need for military and civilian organizations in many fields to combine their efforts for the solution of what is a major public health as well as a major military problem.

The first of the volumes on communicable diseases to be published concerns diseases transmitted through the respiratory and alimentary tracts. It begins with an excellent chapter on modes of transmission and then discusses special diseases and disease groups.

Interesting comparisons can be made between the diseases discussed in this volume and those discussed in the World War I history. The slight discussion of amebiasis in the World War I history and the extended discussion in this volume, for instance, indicate not only the importance of this disease at this time but also the greatly increased knowledge concerning it.

Tuberculosis was a major problem in World War I, when X-ray techniques were crude by modern standards and screening was chiefly characterized by good intentions. Patients from World War I are still part of the population of Veterans Administration hospitals. In World War II, the efficient screening and case-finding methods which had been developed between the wars were put to good use. The Military Government Organization undertook the control of tuberculosis as one of its first functions during the period of occupation, rightly regarding the restoration of normal case-finding and reporting practices as quite as

important as the provision of beds for tuberculous patients. Research during the war also produced valuable information on two subjects. One was the inherent risk of small lesions whose activity is difficult to determine. The other was the causes of breakdown from tuberculosis, including the types of stress which lead to relapse and those which can be withstood without the breakdown of a latent lesion.

Historically, meningococcal meningitis has always been a disease of serious concern to workers in both civilian and military preventive medicine. Across the years, whatever progress has been made in prevention and treatment in one field has been quickly applied in the other. Both civilian and military experts worked on this disease in World War II. Sulfadiazine, used prophylactically, was reasonably effective in the military organization, but prevention in a heterogeneous and nonregimented civilian population was—and still is—impractical. Treatment, in spite of modern advances, is still far from satisfactory. The situation in World War II was improved over World War I. Although this disease ranked 76th in admissions to Army hospitals in the first world war, it was the 6th ranking cause of death because 40 percent of the cases were fatal. Civilian and military experts must continue to pool their efforts if the disease is to be controlled.

Use of Preventive Medicine Volumes

The volumes in the preventive medicine series are not a chronological record of events. Their primary objective is a searching evaluation of military preventive medicine in a global war. They tell the engrossing story of attempts to control diseases, modify environments, and maintain the health of military and civilian populations under wartime conditions in a conflict that covered the earth. Some diseases had never before been recognized. Every new environment offered new potential threats. The very water the troops drank and the rivers in which they bathed were hazards. As always happens, our knowledge of the natural history of disease and of human ecology in its broadest perspective was increased by these wartime experiences.

The principles and practices of preventive

medicine and public health had to be applied to young and healthy men in military service, and they also had to be applied to large civilian populations of all ages and races and of both sexes. In liberated and occupied countries, this was the responsibility of the Civil Affairs and Military Government Organization. The prevention of disease and the control of environmental factors were accomplished rapidly and efficiently because of military-civilian teamwork. The principles and practices of military preventive medicine and of civilian public health often overlap, but they are fundamentally the same, even when the local population and environment to which they must be applied are different.

Reviewers of the volumes of the preventive medicine series have shown great appreciation *of their objectives as well as of the methods by which these objectives have been attained.* Among the points they make are these:

1. As these books show, preventive medicine is a comprehensive discipline, which encompasses far more than environmental sanitation and the control of communicable diseases.

2. In these books, the source material is so distilled that the reader who could not possibly digest it in the mass need concern himself only with the essence. They are packed with factual data, including comprehensive and extremely useful statistical data. They also frankly confess errors.

3. These are very readable books. Says a British reviewer, "Our American cousins have good reason to be proud." Says an American reviewer, who was undoubtedly in service himself, these volumes are recommended to "those hopefully still vigorous spirits who might enjoy just reminiscing," a point which reviewers of other volumes in the series have also emphasized.

4. The material is applicable to many areas of civilian public health and preventive medicine. These volumes contain much for such specialists as the sanitary engineer and the sanitarian, the entomologist, the industrial hygienist and others in industrial practice, the veterinarian, the nutritionist, and the public health nurse. They should also be of interest and profit to the organizations, institutions, and agencies in which these specialists work,

including both official and voluntary health agencies, medical schools and schools of public health, research institutions, hospitals, medical departments of commercial firms and factories, and national and international health agencies outside the United States.

Practicing physicians today must have a broad understanding of all aspects of the prevention of disease and of the influence of the physical and social environment upon their patients. They too will find these books useful.

Finally, civil defense organizations require a specific knowledge of emergency health programs which are applicable upon a mass basis. The preventive medicine story of World War II as it is recorded in these volumes is the basis of much of the medicine of the future, in which medicomilitary and civilian cooperation will be necessary for the protection and maintenance of health under conditions which invite disease and trauma.

It takes more than the mere existence of a medical military history to make such a history useful. The value of the Civil War history was never fully realized because it was distributed on an individual basis, through members of the Congress. The distribution of the World War I medical history was considerably more logical, but it was scarcely publicized, and we paid dearly for the oversight in World War II, when the majority of medical officers were almost completely ignorant of what had been done in World War I both in their special fields and

in the general medicomilitary field. As I have helped to prepare the medical history of World War II, I have had many occasions, for comparative purposes, to refer to the World War I history, and, to my chagrin, I have often found in these volumes the plain and clear answers to many of the problems over which I and my associates struggled in World War II. It would pay all of us to remember another saying of Sir William Osler's, that by the historical method alone can many of the problems of medicine be approached most profitably.

Conclusions

Since the end of World War II, there has been a dramatic decline in the extent and severity of many diseases of public health and military significance. Malaria, for instance, by a continuation of the wartime lessons, is in a fair way to being tamed and even eradicated in most of the world within the near future. This is also true of other diseases. But the work is far from done, and those responsible for progress in preventive medicine and public health in civil life may profit greatly by studying the experiences of military men in World War II. In the volumes devoted to preventive medicine in the official history of the U. S. Army Medical Department are set forth methods, techniques, and basic philosophy as they are applicable to civilian public health and preventive medicine of today and even of tomorrow.

PHS Cancer Chemotherapy Project Matures

The Public Health Service's cancer chemotherapy program, mobilizing resources of hospitals, universities, research laboratories, industry, and government, has steadily expanded over the last 5 years with the following results:

- More than 40,000 compounds and other materials are being tested annually on more than a million mice to uncover chemicals with anticancer properties. About 70,000 materials have been screened.
- Between 400 and 600 materials a year are promising enough to be further analyzed with tests in mice and larger animals. Nine out of 10 materials are rejected as either ineffective or too toxic.
- About 40 materials a year are approved for clinical trials with human patients. Currently 70 are undergoing clinical trials.

Although incidence of poliomyelitis in this relatively isolated community of western Montana has been considerably lower than in more densely populated urban areas, the epidemiological characteristics of the disease have remained unchanged.

Naturally Occurring Poliomyelitis Antibody in Hamilton, Montana

ROBERT K. GERLOFF, M.A., CARL L. LARSON, M.D., and LILLIAN R. B. GLESNE

SEROLOGIC SURVEYS have been useful for epidemiological study of many diseases, detection of their occurrences in communities, and determination of the immune status of populations to such diseases. They have been especially applicable to studies of poliomyelitis, and, for this particular disease, have been greatly enhanced by the development of simplified, tissue-culture tests for neutralizing antibody. Among the more extensive poliomyelitis investigations in the United States is the one of Melnick and his associates (1) made in Charleston, S. C., and Phoenix, Ariz. Fox and his associates (2) have thoroughly studied three communities in Louisiana.

The survey reported here was conducted in a rural community in western Montana. Data portraying incidence of poliomyelitis antibody in this area emphasize particularly the relationship between age and prevalence of antibody, relationship between age and antibody titer, and intrafamilial spread of poliovirus.

General Procedure

The community studied was Hamilton, Mont., and its environs of approximately 24 square miles. Population of this area is about 5,500, of which 75 percent reside in the town itself. Mountainous terrain, practically without settle-

ment, extends 75 miles east, 100 miles south, and 125 miles west from the study area. U. S. Highway 93 passes through Hamilton in a north-south direction; a spur busline connects it with transcontinental transportation at Missoula, 50 miles north. In contrast to many densely populated Atlantic and Pacific coastal areas, this community is relatively isolated with respect to geographic setting and proximity to main commercial routes of travel.

Through cooperation of the four schools in the area, 1,034 blood samples were collected in February 1955 for serologic study. Most were from children in grades 1 through 12, but 138 were from adults and 50 were from preschool children. Specimens were obtained from 94 percent of the pupils in the three elementary schools and from 76 percent in the high school. Brief histories, including age and location of residence, were obtained from all participants. Presumably, none of them had received poliomyelitis vaccine, since commercial vaccine was

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not yet available and experimental vaccine had not been tested in this area. Serums were classified according to age of the donor (table 1); age 6-7, for example, signified any age from 72 months through the day preceding the eighth birthday. Children less than 6 years old were grouped as preschool children, and persons 21 years or older were grouped as adults.

Laboratory Procedures

Serums were frozen at -24° C. until tested for poliomyelitis neutralizing antibody. A metabolic inhibition test, similar to one described by Salk and co-workers (3), was employed. All serums were tested in twofold dilutions, 1:8 through 1:1,024. Serums with 1:8 or higher titer were designated seropositive. Those with titer of 1:1,024 might have been positive also in higher dilutions, if such dilutions had been tested.

Age and Incidence

With a few exceptions, incidence of antibody to a specific type of poliovirus or to a combination of types gradually increased as age of the subjects increased (table 1). The greatest deviation from this trend occurred with respect to type 2 antibody, which was found in 48 percent of children aged 14-15, but in a considerably smaller percentage of children immediately older or younger.

There was no evidence that poliovirus either had recently entered the community or had been present several years before and then disappeared, leaving only older persons immune. In all age groups, type 2 antibody was more prevalent than type 3; in all except the 12-13 and 14-15 age groups, type 1 antibody was more prevalent than either type 2 or type 3. Among preschool children, 51 percent possessed one or more types of antibody, and the percentage gradually increased by age groups to 96 percent in adults. However, only 2 percent of preschool children, about 5 percent of high school students, and 20 percent of adults had all three types of antibody.

Age and Antibody Titer

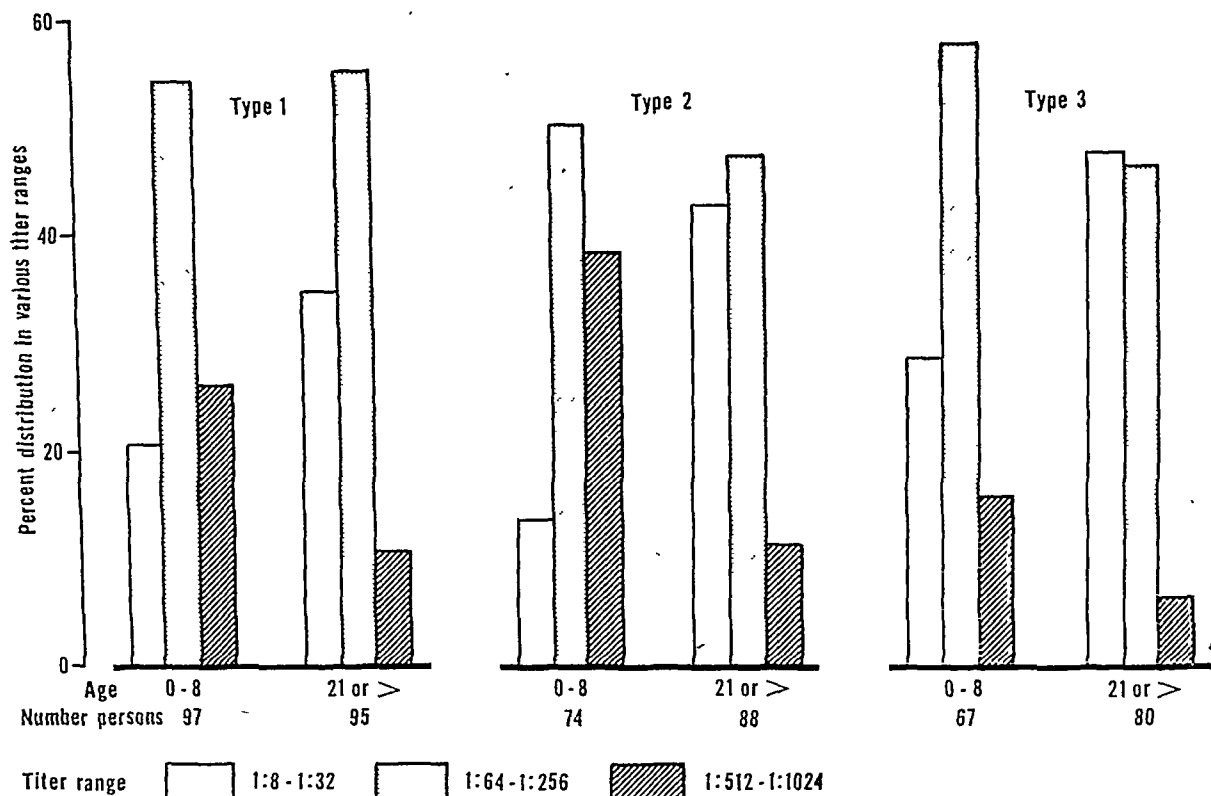
Seropositive serums from the adults and from children through 8 years of age were compared on a basis of antibody titers to the three polioviruses. This age range of children was selected so that numbers of seropositive serums from them and from the adult group would be similar. Type 1 antibody occurred in 97 of the 276 children and in 95 of the 138 adults (see chart). Whereas 21 percent of the children and 35 percent of the adults had titers in the 1:8 to 1:32 range, 26 percent and 10 percent, respectively, had titers in the 1:512 to 1:1,024 range. Almost equal percentages had titers in the intermediate range of 1:64 to 1:256. Titers of antibody to the other polioviruses in the two age groups were similarly

Table 1. Distribution of poliomyelitis antibody in a population sample of 1,034 persons, Hamilton, Mont., by age group and poliovirus type

Age (years)	Number of persons in group	Percent seropositive against—				
		Type 1	Type 2	Type 3	All 3 types	One or more types
Under 6 (preschool)	50	31	14	12	2	51
6-7	141	33	28	24	3	61
8-9	152	39	33	28	6	67
10-11	155	37	36	34	7	68
12-13	157	37	37	33	7	70
14-15	130	44	48	35	4	80
16-17	111	53	38	36	6	85
21 or over (adults)	138	69	64	58	20	96

¹ With reference to the chart, 85 children in this group were 8 years old.

Relationship between age and poliomyelitis antibody titer in persons who were seropositive.



compared. However, because the same type or types of antibody did not occur in all persons, the composition of the groups included in the second and third analyses varied somewhat from that of the first.

Regardless of antibody type, more high titers were found in seropositive children than in seropositive adults. Differences were greatest in the type 2 analysis where only 11 percent of adults had titers in the high range as compared with 38 percent of children.

Intrafamilial Spread of Poliovirus

Serums from all children were grouped according to families (table 2). The extent to which poliovirus spreads within a family following its introduction by one or more carriers was studied by examining the degree of similarity in seroimmune patterns of children within each family. Each of the three types of poliovirus was considered a distinct disease entity, capable of invading a family independently of the other two types. Each

family, therefore, represented three family-type combinations. If, for example, the two children in a particular family both possessed type 1 antibody, neither had type 2, and only one had type 3, two of the combinations were said to be in agreement, but the third, in disagreement.

Of the 468 combinations represented by families with two children, 87 percent were in agreement and 13 percent were in disagreement. The analysis was continued to determine how many instances of disagreement could be explained on the basis of age difference. If the child possessing antibody was the older, perhaps he had acquired the antibody through natural infection before the younger child was born. Sixty-six percent of the instances of disagreement could be accounted for in this manner. As a final figure, 96 percent of the combinations represented by families with two children gave either perfect agreement or disagreement which might be explained by order of birth. Comparable final figures for families with 3 or 4 children were 90 and 79 percent,

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With a few exceptions, incidence of antibody to a specific type of poliovirus or to a combination of types gradually increased as age of the subjects increased (table 1). The greatest deviation from this trend occurred with respect to type 2 antibody, which was found in 48 percent of children aged 14-15, but in a considerably smaller percentage of children immediately older or younger.

There was no evidence that poliovirus either had recently entered the community or had been present several years before and then disappeared, leaving only older persons immune. In all age groups, type 2 antibody was more prevalent than type 3; in all except the 12-13 and 14-15 age groups, type 1 antibody was more prevalent than either type 2 or type 3. Among preschool children, 51 percent possessed one or more types of antibody, and the percentage gradually increased by age groups to 96 percent in adults. However, only 2 percent of preschool children, about 5 percent of high school students, and 20 percent of adults had all three types of antibody.

Age and Antibody Titer

Seropositive serums from the adults and from children through 8 years of age were compared on a basis of antibody titers to the three polioviruses. This age range of children was selected so that numbers of seropositive serums from them and from the adult group would be similar. Type 1 antibody occurred in 97 of the 276 children and in 95 of the 138 adults (see chart). Whereas 21 percent of the children and 35 percent of the adults had titers in the 1:8 to 1:32 range, 26 percent and 10 percent, respectively, had titers in the 1:512 to 1:1,024 range. Almost equal percentages had titers in the intermediate range of 1:64 to 1:256. Titers of antibody to the other polioviruses in the two age groups were similarly

Table 1. Distribution of poliomyelitis antibody in a population sample of 1,034 persons, Hamilton, Mont., by age group and poliovirus type

Age (years)	Number of persons in group	Percent seropositive against—				
		Type 1	Type 2	Type 3	All 3 types	One or more types
Under 6 (preschool).....	50	31	14	12	2	51
6-7.....	141	33	28	24	3	61
8-9.....	152	39	33	28	6	67
10-11.....	155	37	36	34	7	68
12-13.....	157	37	37	33	7	70
14-15.....	130	44	48	35	4	80
16-17.....	111	53	38	36	6	85
21 or over (adults).....	138	69	64	58	20	96

¹ With reference to the chart, 85 children in this group were 8 years old.

poliovirus apparently are nonexistent in the community, as noted in an unpublished sewage study by C. L. Larson and his associates.

Because socioeconomic differences in the community are minimal and have little relationship to factors ordinarily considered of public health significance, the correlation between incidence of antibody and socioeconomic status was not thoroughly studied. The older north and newer south sections of the town of Hamilton were compared, however. In the south section, where the average family is generally considered to be somewhat above that of the north in income, cleanliness, and education, 41 percent of 217 children were without antibody to any type of poliovirus. In the north section, 20 percent of 192 children were in a similar condition.

Since high titers were found more frequently in children than in adults, they appear more likely to result from recent initial infections than from continued reexposure throughout life. Melnick and his associates (8) derived the same conclusion from complement fixation tests of human serums collected in Cairo, Egypt. Because poliomyelitis complement-fixing antibody, which is of relatively short duration in the blood, was confined almost entirely to childhood, re-infections in older persons were assumed to be rare. Le Bouvier (9) likewise concluded from data on Cairo residents that poliomyelitis antibody tends either to be absent from children or to exist in high titer, while in adults many medium or low titers are intermingled, due to gradual diminution of titers with age.

The data on seroimmune patterns of multiple children within the same families (table 2) augment other information (10,11) on the importance of intrafamilial contact in spread of poliovirus.

Since complement fixation tests were performed on serums from children of a rather narrow age span, results are of limited value. Ratios of percentage of children possessing neutralizing antibody to percentage possessing complement-fixing antibody were 6.3, 2.3, and 2.1 for types 1, 2, and 3 antibody, respectively. Because poliomyelitis complement-fixing antibody disappears much more rapidly than neu-

tralizing antibody, these data would indicate that types 2 and 3 poliovirus had invaded children 0-12 years old more recently than had type 1.

Summary

Incidence of poliomyelitis antibody resulting from natural infection in a relatively isolated rural community of western Montana was determined by tests of 1,034 serums collected from residents, mostly children, in and near the town of Hamilton. Neutralizing antibody to all three types of poliovirus was present, but in nearly all age groups type 1 antibody was the most prevalent and type 3 the least prevalent. Incidence of antibody generally increased with increasing age of the population, but spread of poliovirus has been much slower in this community than in densely populated areas. Only 5 percent of the high school pupils, aged 14-17, had been infected by all three types of virus. High antibody titers occurred more frequently in children than in adults. Multiple children in individual families were, in most instances, either all immune or all non-immune to a particular type of virus, a fact which portrays the importance of household contact in spread of poliovirus through a community.

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Table 2. Common occurrence of poliomyelitis antibody in multiple children of individual families

Children per family	Number of families	Number of family-type combinations ¹	Percent of family-type combinations—	
			With perfect agreement in antibody pattern ²	With perfect agreement or explainable ³
2-----	156	468	87	96
3-----	61	192	71	90
4-----	19	57	63	79
5-----	4	12	92	-----

¹ See text for explanation.

² Antibody of a specific type either present in all children or absent in all.

³ Explainable on the basis of order of birth of multiple children in a family.

respectively. Only 4 families with 5 children were available for study, but 92 percent of the combinations represented by them gave perfect agreement.

Complement Fixation Studies

Complement fixation tests on 225 serums, representing a sample of approximately 40 percent of the children in the age group 0-12, were performed by Dr. David B. Lackman of this laboratory. Unheated antigens were used throughout. The percentages of the group possessing types 1, 2, and 3 neutralizing antibody were, respectively, 44, 37, and 25, while those with complement-fixing antibody were 7, 16, and 12.

Discussion

The three principal conclusions from these data, namely, that prevalence of poliomyelitis antibody in people of this community is directly related to their age, that children generally have higher antibody titers than adults, and that intrafamilial contact rapidly disseminates poliovirus, agree with conclusions of other investigators who have studied entirely different communities, most of which have been urban. During the past 18 years, type 1 has apparently been the most common type of poliovirus in this community, type 3 has been the least common,

and type 2 has been intermediate. This relationship in prevalence of the three types also exists in other areas of Montana (4). The high incidence of type 2 antibody in the 14-15 year age group, as compared with older or younger children, probably reflects past invasion of one particular classroom by type 2 virus.

Rate of acquisition of poliomyelitis antibody with increasing age appears lower in this community than in many other parts of the United States and is definitely lower than that in many other parts of the world. However, differences in methods of testing serums, including variations in the lowest serum dilution tested, complicate direct comparison of results reported by different laboratories. In the current investigation, only 6 percent of children 16-17 years old possessed all three types of antibody. Identical results have been reported from Swiss children aged 18-19 (5). In contrast, 40 percent of 5-year-old children in urban areas of Gothenburg, Sweden (6), and 75 percent of children 3 to 4 years old and more than 90 percent of children aged 7-9 in families of low socioeconomic class in Peru and Colombia (7) possess all three types of antibody. Poliovirus apparently spreads in people of western Montana at a rate similar to that in the higher socioeconomic class of people in Charleston, S. C., but at a much slower rate than in this class of Phoenix, Ariz., or in the lower socioeconomic class of either city (1). Poliovirus also spreads much more slowly in this Montana community than in three urban and semirural communities of Louisiana (2).

Slow dissemination of poliovirus in this area is probably due to an interplay of many environmental factors. The community is well separated from others. Many children go to and from school in private buses, but there are no public conveyances. Since there are no private schools, all children attend the same public schools. Streets are wide, homes are relatively far apart, and most homes have ample space for the occupants. Nearly all homes have indoor sanitary facilities. Although many families have private wells for water supply and nearby septic tanks for sewage disposal, necessity for such utilities is not restricted to any particular socioeconomic class. During many months of the year, human carriers of

poliovirus apparently are nonexistent in the community, as noted in an unpublished sewage study by C. L. Larson and his associates.

Because socioeconomic differences in the community are minimal and have little relationship to factors ordinarily considered of public health significance, the correlation between incidence of antibody and socioeconomic status was not thoroughly studied. The older north and newer south sections of the town of Hamilton were compared, however. In the south section, where the average family is generally considered to be somewhat above that of the north in income, cleanliness, and education, 41 percent of 217 children were without antibody to any type of poliovirus. In the north section, 20 percent of 192 children were in a similar condition.

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New Simplified Germ-Free Laboratory

The possibility that germ-free animals may be used for experiment in small laboratories of health departments and universities may be sped by the outcome of field tests of a device which has been demonstrated successfully at the University of Michigan. The cabinet was designed by Dr. Richard Horton, now with the National Institute of Allergy and Infectious Diseases of the Public Health Service.

Similar units are being made available to several institutions for field trials, some to be tested by experienced investigators and others to be tested by men with no previous experience with germ-free techniques.

Although germ-free laboratories have been operated successfully at Notre Dame University, Walter Reed Army Medical Center, and the National Institutes of Health, the cabinet designed by Dr. Horton is intended to func-

tion on a relatively simple and economical scale.

The apparatus, a sealed box of glass and metal, is about the size of a frozen food cabinet. Investigators reach into the sterile area through sealed-in rubber gauntlets. A pressure compartment at one end sterilizes all food and equipment by steam before it enters the living quarters of the germ-free animals. All air introduced into the cabinet is heated to 750° F. and is then cooled before it passes into the chamber. Excess food and feces have remained in the box for months without odor or signs of decomposition.

Dr. Gerald Abrams, Michigan pathologist, who tested the machine with guinea pigs delivered into the cabinet by sterile cesarean section, believes the device is also virus proof, but he has not yet tested that hypothesis.

*Conference of Municipal Public Health Engineers
on air pollution control, October 6, 1958*

Responsibilities of Local Health Agencies for Air Pollution Control

ACUTE effects on health, resulting in death, attributable to gross air pollution exposures of masses of people have been recognized and reported. More recently studies have suggested subclinical effects which may develop into chronic and acute biological damage upon prolonged exposure to moderate amounts of air pollution. As society advances, conditions which impede attainment of the maximum of physical and mental well-being are considered detrimental to health. Thus, air pollution which interferes with food consumption, water intake, sleep, relaxation, and recreation or which creates physical or mental stress is recognized as impairing health. In the past few decades concern with air pollution has changed considerably from primarily problems of smoke and fly ash to problems involving toxic and noxious fumes, gases, and dusts as well.

While the exact nature of various interactions of air pollutants has yet to be determined precisely, public interest in air pollution continues to increase. Consequently, each year additional local health officers and public administrators must face these questions: Should an air pollution control program be started in this community? and, if so, What should be the role of the local health department? This statement will not attempt to answer these questions; rather it is intended to focus attention on factors to be considered.

Public health administrators will find it is easy to adhere to the general thesis that air pollution control is best accomplished at the lowest level of government capable of effective action. Because air pollution control involves localized as well as area problems basic

activities are required at the lowest level capable of supporting the program needed. In the absence of precise tolerance limits for aerial contamination, local citizens' opinions of relative values tend to set the standards for community acceptability. Such standards may frequently be qualitative rather than quantitative, and should consider not only health and well-being but also damage and deterioration to property, interference with use of homes, businesses, or recreational facilities, and hazard to air and ground transportation. Thus each area must define its own need for air pollution control and determine the extent to which it will support such activities. Evaluation of need for air pollution control is facilitated by an inventory of sources, supplemented by strategic sampling and a recognition of other factors peculiar to the community.

It is not the purpose of this statement to advance public health agencies as the only logical administrative units to direct air pollution control programs. However, health departments do possess many valuable resources and skills useful to such activities. Furthermore, public health officials must exercise more interest in air quality if they are to satisfy the total health needs of the people they serve. Therefore, this statement will attempt to outline in an objective way the contributions that public health has to offer air pollution control.

There are several possible roles for a local health agency. The health department may be assigned direct, primary, and sole responsibility for air pollution control. It may provide advisory, consultative, or staff services if another agency is directly responsible. In some circumstances, responsibility may be split

Committee Members

Members of the Committee on Air Pollution Control of the Conference of Municipal Public Health Engineers which formulated this statement were P. W. Purdom, director, division of air pollution control and environmental sanitation, Department of Public Health, Philadelphia, chairman; Eric W. Mood, director, bureau of environmental sanitation, Department of Public Health, New Haven, Conn.; and Charles L. Senn, director, sanitation division, Los Angeles City Health Department.

Also members were John W. Lemon, administrator, Fulton County Health Department, Atlanta, Ga.; Charles M. Copley, Jr., deputy health commissioner, environmental sanitation services, St. Louis Health Division, St. Louis; Wilmer H. Schulze, assistant commissioner of health, sanitary section, Baltimore City Health Department; and Stanley B. Stolz, public health engineer, Department of Public Health, New Rochelle, N. Y.

between two departments, one primarily a smoke abatement unit and the other the health department with responsibility for controlling odors and gaseous emissions.

Split jurisdiction does not readily permit unified planning of a total program and provides an opportunity for some problems to fall between the two agencies with resulting neglect or duplication. This type of administrative arrangement is so awkward that it is not recommended and, consequently, will not be discussed further.

Factors in Assigning Responsibility

There are many bases for deciding which unit of government should be assigned responsibility for air pollution control. It is true that the best selection depends on the local situation, but this statement alone does not offer any guide to an objective administrator. There are several criteria which may be used to ascertain the feasibility and appropriateness of assigning responsibility to any unit.

Perhaps the most important factors are the degree of emphasis which the community desires to place on this activity and the extent it is willing to support air pollution control

through appropriation of funds. In the Los Angeles County Air Pollution Control District, where appropriations have ranged around \$4 million annually, or about 50 cents per capita, it was only reasonable to establish an independent agency with air pollution control as its sole objective. In areas where local stresses have not been so great, there have been advantages in utilizing the administrative structure and other resources of existing agencies.

Where there is a choice to be made between two or more agencies, an objective analysis should consider these factors:

- Adequate administrative direction.
- Capability of the unit to provide, or acquire, the necessary requisites for the service.
- Possession of a staff of trained personnel adaptable to air pollution control work.
- Willingness of the unit selected to give to the activity the emphasis desired by the public.
- Availability of laboratory facilities.
- Benefits accruing from coordination with related activities.
- Public attitude.

From the perspective of these factors, it is readily apparent that health agencies have a great deal to offer to an air pollution control program.

Most health departments have established divisions that are principally concerned with the elements of the environment that affect health—pure food and water, a safe and healthy home, work, and recreational environment, and sanitary waste disposal. The air supply naturally must be considered in association with these other environmental fundamentals vital to life.

Where air pollution control is a responsibility of the health agency, it has been found to be advantageous to the agency's other responsibilities. Sanitarians in their recommendations for the ventilation of food establishments consider the problem of cooking odors. Industrial hygiene proposals for protecting workers inside the plant are coordinated with air pollution control requirements to prevent the uncontrolled venting of noxious fumes, gases, and dusts to the atmosphere. Disposal of waste products, whether liquid, solid, or gas, can be considered from an overall point of view. Laboratories used for industrial hygiene and

other purposes can also serve the air pollution control activity.

Health departments are equipped with personnel and facilities for public education, a most important aspect of an air pollution control program. Also, they have physicians who are experienced in medical epidemiology and who can analyze the data available and establish the proper correlation between community health and air pollution. Not the least asset is the public health administrator's orientation to stress prevention.

These advantages are attested, according to a 1956 survey, by the fact that the health department was responsible for air pollution control more often than any other single type of agency (1). This is not to belittle the very fine work of units in other departments. In fact, where smoke abatement is the major concern, there may be logical reasons to locate the activity elsewhere than in the health department. However, as a total approach to air pollution control evolves, it seems to have a greater affinity to health agencies or independent units.

The health officer is cautioned that he should not rush into an air sanitation program if he is not prepared to follow through with a total program, one that will attack nuisance problems of smoke, dust, and offensive odors as well as those pollutants whose association with specific biological responses is more readily proved. He must be prepared to give budget support and emphasis to the program to the extent of public demand. And he should add to his staff the chemical and mechanical engineers and other personnel necessary to service competently the community's needs.

Services Provided by Control Unit

Since ability to give the service desired is one of the most important factors in deciding what duties to assign an agency, the services provided by an air pollution control unit should be reviewed.

One basic activity inherent in practically all programs dealing with the environment is the observation and investigation of conditions in the field. Complaints are frequently the initial cause for the action, and many communities are content to measure the effectiveness of a program by the absence of complaints. Complaints

rest upon such tenuous factors as emotional reactions, social standards, past history, and vested interest that their usefulness is of a limited nature. To be sure that the community maintains the quality of air desired requires continuing self-initiated observation and surveillance. This immediately creates a need for standards for evaluation. The general purpose of the community's air pollution control program and the conditions of pollution which the community will not tolerate should be stated in a basic law adopted by its legislative body. These premises are usually amplified by more detailed standards and regulations promulgated by a designated rule-making body. With written criteria of this type it is possible to make objective field evaluations and initiate needed corrective actions uniformly and fairly.

Sighting smoke and dust and smelling odors is basic to most programs in correcting the most offensive gross pollution. It will soon become apparent, however, that treatment after illness is not the way to run an air pollution control program. Prevention, as in any other public health program, is the keynote of air pollution control. The chief preventive tool utilized is the review and approval of plans for new installations and major alterations or modifications of existing heating and processing equipment and related control devices.

Approval of plans leads logically to performance testing after an installation is complete. Such testing is also applied to existing installations to determine the extent to which they comply with legal standards for controlling emissions. Testing of stack emissions may be done by the governmental agency itself or under its supervision by the company in question, or by a consultant to either the agency or company. Engineering surveys of sources of emission help to determine where such tests will be most helpful.

Consideration should be given to air pollution in community planning, development, and redevelopment. There should also be some activity directed toward determining what is happening to the community's air supply on an overall and long-range basis. This involves sampling the air for analysis and correlating sample data with meteorologic factors and other conditions.

Atmospheric sampling and stack testing require the availability of laboratory services. The larger health departments frequently have laboratories serving industrial hygiene and sanitary engineering activities which can be adapted for air analyses. Also, many smaller local units use facilities made available through the cooperation of State health departments and other agencies. In some instances laboratory service is obtained by contract with an educational institution or private facility.

Personnel

The need for personnel is more directly related to the character of the community and the emphasis and quantity of services desired than to population and area served.

If inspections and observations are made, various types of personnel can be trained to do the work. However, if instruction in appropriate fuel-firing methods for heating equipment is also to be given, then personnel with practical experience as stationary engineers are required. In persons who evaluate and give advice regarding problems of dust, fumes, and gases, and who review plans, appropriate mechanical and chemical engineering training and air pollution control experience are desired assets. Laboratory work and sampling require either chemists or chemical engineers. All the various services require clerical assistance.

It can readily be seen that the smallest health units can afford few of these services other than provision of local observation and inspection. If the unit is so fortunate as to have an engineer on its staff, it can undertake other services. Lacking one, it will have to rely on State assistance for technical and laboratory services.

To establish a semi-independent, full-time air pollution control service would seem to require a minimum of three persons, an engineer-director, a clerk, and a chemist. In some circumstances, some agencies might prefer an "operating engineer" type of inspector instead of a chemist. This decision might depend on the background of the engineer-director.

Such a service, under 1958 economic conditions, would require an annual budget of at least \$15,000 to \$20,000. This would mean an

expenditure of 15 to 20 cents per capita for a community of 100,000 population. Therefore, it is unlikely that very many communities of less than 100,000 population will want to establish semi-independent, full-time units. Larger units can seldom operate a program on less than 5 cents per capita, while 10 to 15 cents is more likely, and some spend from 30 to 50 cents per capita.

Even a unit with the minimum staff indicated will require some assistance from the State agency on more complex and unusual problems. It would probably be unwise for a health officer to assume responsibility for air pollution control without assurance of budget support for at least the minimum staff indicated, unless there is ample assistance in quality and quantity of personnel and facilities from the State agency for the necessary technical and analytical work.

Role of Local Health Department

Now that criteria for establishment and assignment of the air pollution control functions have been reviewed, as well as the services provided and staff required, it is possible to consider objectively a more precise definition of the role to be exercised by the local health agency. The health department either may be primarily responsible for the administration of the program, or it may serve in an advisory and consultative capacity.

It appears self-evident that the health agency must be considered and consulted, even in situations where it does not have the primary responsibility. The health department has a previously established concern with the ventilation of food establishments, maintenance of acceptable atmosphere in industrial and other work areas, and standards for the storage and disposal of wastes, particularly contaminated wastes such as those of clinics and hospitals.

The impact of air pollution control regulations on these matters and the impact of health department activities on air pollution should be considered by both the health department and the air pollution control agency. Joint consideration of proposed changes in standards appears essential. A mechanism for joint review of plans under which one agency would

not grant approval without consent of the other is desirable.

In some circumstances, the health department may have established laboratory facilities for industrial hygiene and sanitary engineering. Such facilities could be used by the air pollution control unit to avoid the necessity of building a new laboratory. The health department then would serve as a contractor of services as well as consultant.

Where prime responsibility for air sanitation is vested in the health department, the health officer must provide the vigorous leadership necessary to combat air pollution successfully and to foster the social and economic development of the community. The health agency must also provide in a competent and efficient manner the various services such as answering complaints, observing air pollution episodes, making engineering surveys of air pollution sources, testing stack discharges, sampling and analyzing the air over the community, reviewing plans, and issuing permits.

Also, the health department must assume responsibility for coordination of air pollution control efforts with other governmental operations, such as, city planning, zoning, urban development and redevelopment, and traffic. The health department cannot ignore air pollution nuisances and concentrate only on health hazards; it must provide a total community program to satisfy all needs.

In many instances, air pollution problems transcend the boundaries of a single political jurisdiction. This is an old problem for public health administrators. Cooperation is necessary to develop the appropriate regional administrative machinery to handle such problems effectively.

In a few areas, special districts or authorities have been established. However, such single purpose districts help to confound the problem of government in metropolitan areas. Also, many political scientists object to the removal of control of the government by the people that is inherent in many such systems. It would seem that the experience of public health adminis-

trators could be directed to this problem to evolve a more satisfactory solution.

Summary

There appear to be a few basic points that public health administrators and others may consider with respect to the establishment and organization of air pollution control activities:

1. Local conditions and emphasis desired will help determine the best organizational setting for any air pollution control activities.

2. Observed and suggested health effects of air pollution will cause increased investigation by health authorities.

3. Because of its natural interest in the total health of the community, the health agency must be concerned with air pollution.

4. The health department may be involved in air pollution control in 1 of 2 ways: either as a consultant and adviser or as a primary administrator.

5. The health department's concern with the total environment, of which air is a vital component, provides many advantages favoring the health department as the primary administrator of the air pollution control program.

6. The health officer should avoid commitments to air pollution control when he is unwilling or unable to provide the leadership, budget, and emphasis required by local conditions.

7. Where public health administrators are interested in air pollution control, the health department has much to offer in the way of experienced community leadership, efficiency through coordination with other activities, adaptable personnel with parallel training and experience, and laboratory facilities. In such a setting, a program may be developed that will protect the public health and foster the economic and social development of the community.

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The need for personnel is more directly related to the character of the community and the emphasis and quantity of services desired than to population and area served.

If inspections and observations are made, various types of personnel can be trained to do the work. However, if instruction in appropriate fuel-firing methods for heating equipment is also to be given, then personnel with practical experience as stationary engineers are required. In persons who evaluate and give advice regarding problems of dust, fumes, and gases, and who review plans, appropriate mechanical and chemical engineering training and air pollution control experience are desired assets. Laboratory work and sampling require either chemists or chemical engineers. All the various services require clerical assistance.

It can readily be seen that the smallest health units can afford few of these services other than provision of local observation and inspection. If the unit is so fortunate as to have an engineer on its staff, it can undertake other services. Lacking one, it will have to rely on State assistance for technical and laboratory services.

To establish a semi-independent, full-time air pollution control service would seem to require a minimum of three persons, an engineer-director, a clerk, and a chemist. In some circumstances, some agencies might prefer an "operating engineer" type of inspector instead of a chemist. This decision might depend on the background of the engineer-director.

Such a service, under 1958 economic conditions, would require an annual budget of at least \$15,000 to \$20,000. This would mean an

expenditure of 15 to 20 cents per capita for a community of 100,000 population. Therefore, it is unlikely that very many communities of less than 100,000 population will want to establish semi-independent, full-time units. Larger units can seldom operate a program on less than 5 cents per capita, while 10 to 15 cents is more likely, and some spend from 30 to 50 cents per capita.

Even a unit with the minimum staff indicated will require some assistance from the State agency on more complex and unusual problems. It would probably be unwise for a health officer to assume responsibility for air pollution control without assurance of budget support for at least the minimum staff indicated, unless there is ample assistance in quality and quantity of personnel and facilities from the State agency for the necessary technical and analytical work.

Role of Local Health Department

Now that criteria for establishment and assignment of the air pollution control functions have been reviewed, as well as the services provided and staff required, it is possible to consider objectively a more precise definition of the role to be exercised by the local health agency. The health department either may be primarily responsible for the administration of the program, or it may serve in an advisory and consultative capacity.

It appears self-evident that the health agency must be considered and consulted, even in situations where it does not have the primary responsibility. The health department has a previously established concern with the ventilation of food establishments, maintenance of acceptable atmosphere in industrial and other work areas, and standards for the storage and disposal of wastes, particularly contaminated wastes such as those of clinics and hospitals.

The impact of air pollution control regulations on these matters and the impact of health department activities on air pollution should be considered by both the health department and the air pollution control agency. Joint consideration of proposed changes in standards appears essential. A mechanism for joint review of plans under which one agency would

This material is supported by 39 tables and 12 graphs. Explanatory text includes appendixes containing technical notes on methods and definitions of terms.

Air Pollution Measurements of the National Air Sampling Network. Analyses of suspended particulates, 1953-1957. *PHS Publication No. 637; 1958; 260 pages; \$2.*

Air quality data from urban, suburban, and nonurban areas in the United States are reported. The text describes the analytical techniques applied to samples, and monthly and frequency distribution tables are presented for individual pollutants.

These data should be useful in determining correlations and trends in the nature, extent, causes, and effects of air pollution and in establishing the health significance of various pollutant levels.

Pneumoconiosis in Diatomite Mining and Processing. *PHS Publication No. 601; 1958; 96 pages; 55 cents.*

Results of an epidemiological study of diatomaceous earth pneumoconiosis in five diatomite plants in California, Nevada, and Oregon are described.

The report includes a review of the literature, a detailed description of diatoms and the diatomite-processing industry, discussion of the environmental and medical studies conducted, and specific recommendations for dust control, labeling, and a medical program.

The study was made by the Public Health Service in cooperation with the State health departments concerned.

A Manual for Metabolic Balance Studies. *PHS Publication No. 607; 1958; 31 pages; 20 cents.*

This manual presents basic information needed for conducting metabolic balance studies and describes methods used by the Arthritis and Metabolic Diseases Nursing Service of the Clinical Center, National Institutes of Health, Public Health Service.

In addition, there are chapters on the team concept for metabolic balance studies, the metabolic research diet, and orienting the patient.

Liberal illustrated, the manual is designed to aid researchers in nutrition, mineral and electrolyte metabolism, and cancer.

Homemaker Service. *Children's Bureau Folder No. 46; 1958; 36 pages; 15 cents.*

Plausible examples of family crises depict the philosophy and operation of the homemaker service. This booklet tells who may need the service, under what circumstances it may be used, and how it may be financed. Establishing a homemaker service and its value to the community are also discussed.

The Water Pollution Control Program of the U. S. Public Health Service, 1957-1958. *PHS Publication No. 631; 1958; 26 pages; 25 cents.*

After recounting the changing water pollution problems, this brochure describes the program for their control.

The evolution of the program is outlined in sections on legislative history and congressional policy. Construction of sewage treatment plants, interstate enforcement activities, research, and basic data analysis are reported in nontechnical language.

Directed to the individual citizen, the last section summarizes the benefits, goals, and costs of the program.

Child-Caring Institutions. Their new role in community development of services. *Children's Bureau Publication No. 368; 1958; by Martin Gula; 27 pages; 15 cents.*

New patterns in community services and new demands on child-care institutions are discussed in relation to the dynamics of the individual community and changing conditions during the past 50 years.

Against this background, three levels of quality of establishments for the care of children are evolved,

and 20 ways to measure the effectiveness of these institutions are listed.

The booklet stresses the importance of close working relationships between organizations for children and the community. It should be useful to board and professional staff members of social agencies, community planning groups, legislators, and judges.

Where to Write for Birth and Death Records. *PHS Publication No. 630A; 1958; 10 pages; 15 cents.*

Where to Write for Marriage Records. *PHS Publication No. 630B; 1958; 8 pages; 5 cents.*

Where to Write for Divorce Records. *PHS Publication No. 630C; 1958; 8 pages; 10 cents.*

Information for getting records on births and deaths, marriages, and divorces from States, Territories, and other American governmental agencies is supplied. In addition, the first-named publication tells how to obtain records pertaining to births and deaths occurring in selected foreign countries.

Multiple Sclerosis. Hope through research. *PHS Publication No. 621 (Health Information Series No. 92); 1958; leaflet; single copies, 5 cents, \$3 per 100.* Describes symptoms of multiple sclerosis. Reviews theories on causes. Discusses research advances in diagnosis and possible treatment.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

publications

Report of National Conference on Nursing Homes and Homes for the Aged, 1958. *PHS Publication No. 625; 85 pages; 55 cents.*

Complete proceedings of the first National Conference on Nursing Homes and Homes for the Aged held in Washington in February 1958 are presented. Principal addresses, background information, 103 recommendations adopted by the conference, and a synthesis of the discussions which led to each recommendation are included.

Recommendations and related discussions are grouped according to the eight sections in which they were evolved: role of nursing homes and homes for the aged (general policy questions); medical, nursing, and other selected professional services; nutrition and food service; social and related services; environmental health and safety; regulatory agency problems; financing of facilities and services (including design, construction, and equipment facilities); and administration.

Milestones in Venereal Disease Control. Highlights of a half-century. *PHS Publication No. 515; revised 1958; 12 pages; 10 cents.*

Brought up to date to include the newest techniques of serodiagnosis of syphilis, this easy-to-refer-to chronology is a modern history of venereal disease control. It will be useful to teachers, health and social workers, speakers, writers, and others needing ready reference to facts about the progress of venereal disease diagnosis and treatment.

Sources of Morbidity Data, Listing Number 6, 1958. *PHS Publication No. 628; 1958; 83 pages.*

Descriptions of 110 previously unreported projects in the files of the Clearinghouse on Current Morbidity Statistics Projects are grouped according to major type or types of disease, injury, or impairment with which they deal.

There are three indexes: the projects by type of data collection, the organizations chiefly responsible for the research, and the principal investigators. Also included is a section of supplementary notes representing a systematic followup on unfinished projects in the previous five listings.

The number of bound copies for distribution to other than actual and potential contributors is limited. Tearsheets for the projects are on file, however, for persons who inquire about studies of a particular type.

Immunization Information for International Travel. *PHS Publication No. 384; revised 1958; 71 pages; single copies, 30 cents, \$22.50 per 100.*

Immunization requirements for persons entering the United States (including Americans returning from abroad), requirements and recommendations for immunization in 200 other countries, and a list of yellow fever vaccination centers are presented. Information on bringing pets into the United States is in a special section.

Designed primarily for travelers going abroad, health departments, and physicians, this booklet supersedes the 1956 edition and 1957 supplement.

Municipal Sewage Treatment Needs. *PHS Publication No. 619; 1958; by John R. Thoman and Kenneth H. Jenkins; 16 pages; 15 cents.*

Data from the 1957 Inventory of Municipal and Industrial Wastes Facilities show needs for sewage treatment plants. These needs are grouped into six categories including new and replacement plants and additions to existing facilities. Reported data and applicable percentages for the various categories are arranged by States, community population groups, and major drainage basins. Tables show needs for various degrees of treatment as well

as for different types of plants within the primary and secondary groups.

This booklet is intended to be used in conjunction with Statistical Summary of Sewage Works in the United States, PHS Publication No. 609.

Source Materials on Water Pollution Control. *PHS Publication No. 243 (Public Health Bibliography Series No. 22); revised 1958; 24 pages.*

Current references, technical and nontechnical, are grouped under the headings: community action, financing and economic factors, laws and regulations, industrial wastes, domestic wastes, basic data and standards, research, biological aspects of water pollution, water supply, and films. In addition to about 100 PHS publications or reprints, references which may be consulted in libraries or purchased from the sources noted are listed.

Highlights of Progress in Research on Cancer. *PHS Publication No. 623; 1958; 51 pages; 25 cents.*

Research findings reported during 1957 by staff scientists and grantees of the National Cancer Institute, Public Health Service, are summarized to represent selected accomplishments in the study of cancer and to reflect current attitudes toward the more promising avenues of cancer research. The material ranges from basic laboratory studies and statistical analyses of the epidemiology of cancer to clinical research.

Summaries are organized under four broad headings: causation, characteristics, diagnosis, and treatment of cancer.

Health Statistics From the U. S. National Health Survey. Selected survey topics, United States, July 1957-June 1958. *PHS Publication No. 584-B5; 1958; 49 pages; 40 cents.*

Data collected from a continuous nationwide household-interview survey are the bases for this annual summary on disability, acute conditions, chronic conditions, persons injured, physician visits, and dental visits. Included are population estimates for use in rate computation in conjunction with the basic data.

Profile of American Families, 1940-57

WILLIAM F. PRATT

DESPITE the dire warnings we frequently hear concerning the deterioration of the American family, family life is more popular today than at any other time since the turn of the century. But marked changes are occurring in the patterns of family life, many of which have proceeded more rapidly since World War II. Change almost invariably creates tension, especially when it involves the modification of deeply rooted traditions or expectations. Many current social ills have been causally attributed to contemporary family life. If this is so, a basic understanding of changes in family life is indispensable to understanding these social problems.

The number of families in the United States has increased. More than three-fourths of the decline in the proportion of the population "never married" since 1890 occurred between 1940 and 1957 (fig. 1). In this period the proportion of men currently married increased from 59.7 to 67.3 percent, and of women from 59.5 to 66.4 percent (1a, 2a). The number of families increased 35.1 percent between 1940 and 1957 (2b). Four basic factors have contributed to this increase in families:

1. More couples survive to celebrate their golden wedding anniversary. Glick has estimated that median ages to which husbands and wives survive jointly increased 0.5 year between 1940 and 1950 (1b). The improvements in life

expectation since 1950 have undoubtedly extended this gain in the duration of marriage.

2. The proportion of remarried persons has increased. Although this trend started before 1940, the proportion of remarried women among those 15-44 years of age, with husband present, increased 4 percent between 1940 and 1950 (from 9 percent to 13 percent), or more than in the preceding 30 years (1c). The increasing proportion of remarried persons can be ascribed principally to the remarriages of divorced persons. In the years 1950 to 1956, there were 3 to 4 widowed brides and grooms to every 10 divorced brides and grooms (3a).

3. The greatest factor in the increased proportions of currently married persons, quite obviously, is the decline in the proportion remaining single. The proportion single of the population 14 years of age and older declined more than 6 percent between 1940 and 1957, 34.8 to 28.1 percent for men and 27.6 to 21.6 for women (1a, 2a). This decline was observed in each age group in 1955 compared with 1940 (1d). Between 1940 and 1955, the median age at first marriage dropped 1.6 years for men, or almost as much as in the preceding half century, while for women the median age dropped 1.3 years, or about twice as much as in the preceding half century (1e). Two social trends would seem to be particularly significant in the recent decline in the age of first marriage, especially in the oldest 25 percent. College enrollment of married students increased with the advent of the GI bill and the veteran-student. As recently as 1955, many colleges still reported increased enrollment of married students. The increased opportunities for, and acceptance of, married women in the labor force may well have paralleled the GI bill as a factor facilitating

Mr. Pratt is an analytical statistician in the Marriage and Divorce Analysis Section, National Office of Vital Statistics. This report was prepared originally for the American Social Hygiene Association for use in connection with the Conference of Executives of National Organizations in New York City, October 20-21, 1958.

ROCKY MOUNTAIN SPOTTED FEVER: VACCINATION OF MONKEYS AND MAN

By R. R. SPENCER, Surgeon, and R. R. PARKER, Special Expert, United States Public Health Service

In a previous publication¹ we have shown that guinea pigs may be successfully vaccinated against Rocky Mountain spotted fever by injections of phenolized emulsions of tick virus. Data are now submitted which (1) prove that this vaccine will also protect monkeys and (2) suggest that it will confer immunity upon man.

PREPARATION OF THE VACCINE

The production of a potent vaccine from tick emulsions is dependent upon a high concentration of virus in the ticks from which it is prepared. By the injection of decreasing amounts of emulsions of infected tick viscera into guinea pigs, the minimal infectious dose of any given emulsion may be approximately determined. After many such titrations, employing fed and unfed infected ticks (*D. andersoni*) at all stages of the life cycle, it has been found that the highest concentrations of spotted fever virus occur two to four days after the beginning of the adult feeding.²

Such ticks, usually in lots of 100, are permitted to feed three days on guinea pigs, then at once eviscerated one by one and ground in a mortar for 10 or 15 minutes with sterile sand and a few cubic centimeters of salt solution. By this procedure the internal organs

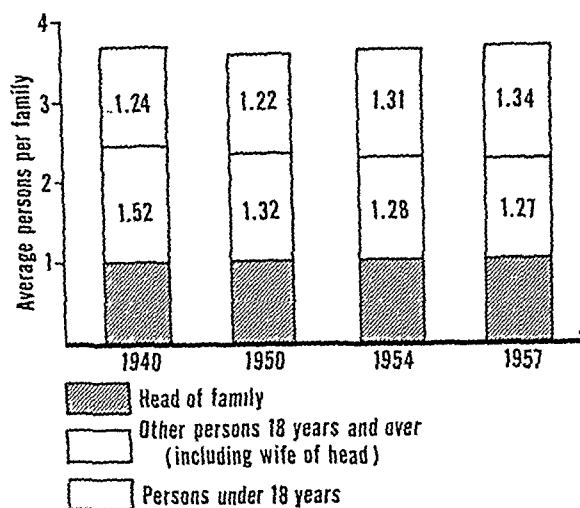
¹Spencer, R. R., and Parker, R. R.: Rocky Mountain Spotted Fever: Experimental Studies on Tick Virus. Pub. Health Rept., Nov. 28, 1924. (Reprint No. 976)

4. Rearing of infected ticks for the preparation of the vaccine.—The rearing of adult ticks from which the virus is to be obtained is a slow and tedious process. (Potent virus can not be obtained from the tick in the early stages of the infection. Virus ingested by larvae does not increase appreciably until the third or fourth stage of nymphs, that any increase in amount or virulence of the virus is often greater than in the nymphs. The virus is then reared to adults; for it is in the adult stage that it is necessary to begin operations. The ticks are selected for rearing on the basis of the amount of virus they contain.)

October 9, 1925, pp. 2159-2167

Dr. R. R. Spencer and Dr. R. R. Parker found that a vaccine produced from tick emulsion immunized monkeys and perhaps man against Rocky Mountain spotted fever. In earlier studies, they demonstrated that this vaccine immunized guinea pigs (Public Health Reports 38: 333-339, Feb. 23, 1923, and 39: 3027-3040, Nov. 28, 1924).

Figure 2. Average family size and family members, by type, 1940, 1950, 1954, 1957.



SOURCE: References 1f and 2d.

result of the changing composition of families (fig. 2). Between 1940 and 1950, the average number of family members under 18 years of age decreased as a result of low birth rates in the 1930's. Between 1950 and 1954, the rising fertility of the late 1940's and early 1950's brought a substantial increase in the average number of family members under 18 years old (1f,2d). This trend continued to 1957 when there were 1.34 persons under 18 compared with 1.17 in 1950. However, throughout the period 1940-57, the average number of persons over 18 years of age fell from 2.52 to 2.27 (2e).

Changes in the household and family situation of persons over 65 years of age have been small, but in the direction of increasing isolation from kinsfolk. Between 1950 and 1957, the proportion of persons over 65 who were classified as unrelated individuals or inmates of institutions increased from 23.5 percent to 24.8 percent, or by 3,645,000 people. Among those 75 years of age and older, in the same period, the proportion classified as unrelated or as inmates of institutions rose from 27.8 to 30.2 percent, which was due to the increase in unrelated individuals.

Between 1950 and 1957, the proportion of persons over 65 years of age who were family members, but not the head of the family or the wife of the head (that is, dependent elders usually), declined from 21.2 to 18.1 percent.

In the same period, the proportion who were heads or wives of heads of husband-wife families increased from 44.4 to 47.2 percent (4,2f). The majority of these latter families (70.8 percent in 1953) were elderly couples with no other adult family members (1g). Also, most of these husband-wife families owned their own homes. The median income in 1949, however, was less than half, \$1,129, that for all husband-wife families, \$2,803 (1h).

Socioeconomic Conditions

The social and economic conditions of families have generally improved throughout the period 1940-57. The educational achievement of husbands in husband-wife families has increased from an average of 8.0 years in 1940 to 10.8 years in 1957. The educational improvement was greater for younger than for older husbands (1i,2g). Improvements in housing are reflected in less "doubling-up" of the generations. From 1947, when 8.7 percent of married couples were without their own household, the percentage dropped to 3.2 in 1957 (1j,2h).

Although money income alone is only a fair indicator of an increase in real wealth or buying power, the trend in family income, which has increased every year except 1949 and 1954 (from a median of \$2,533 in 1944 to \$4,971 in 1957), undoubtedly represents a real gain in the economic conditions of families (5a,b).

The improved social and economic conditions of families are associated with the increasing number of families with more than one earner, and especially with the increase of women in the labor force. Between 1948 and 1956, the number of families with more than one earner increased from 41 to 46 percent among non-farm families and 37 to 42 percent among farm families (5c).

Despite the increasing number of dependent children in families, the participation of married women in the labor force has increased. Among married women living with their husbands, 14.7 percent were in the labor force in 1940, and 29.6 percent in 1957. The increased participation was largest for married women over 35 years of age, which rose from 20.1 percent in 1947 to 30.0 percent in 1956; the largest proportional contribution to this

earlier marriage since the war. These trends may be regarded as part of the generally favorable economic conditions since World War II which have facilitated marriage.

4. Better economic conditions have also contributed to the increase of families by decreasing the "doubling-up" in households. At least 14 percent of the increase in families between 1950 and 1957 was due to the decrease in sub-families which would have otherwise lived with relatives (2*b*).

Fertility Rates

Parents today apparently want, or can afford, to care for more children. In 1956, the fertility rate reached 120.8 infants born alive per 1,000 women 15-44 years of age, which is in sharp contrast to the 1940 rate of 79.9 and is in excess of the 1947 rate of 113.3, the year of the "baby boom." Most important for trends in family size is that the increase in fertility rates in recent years has been due to increasing rates of third and higher order births, which have continued to rise since 1950 (3*b*). Between 1950

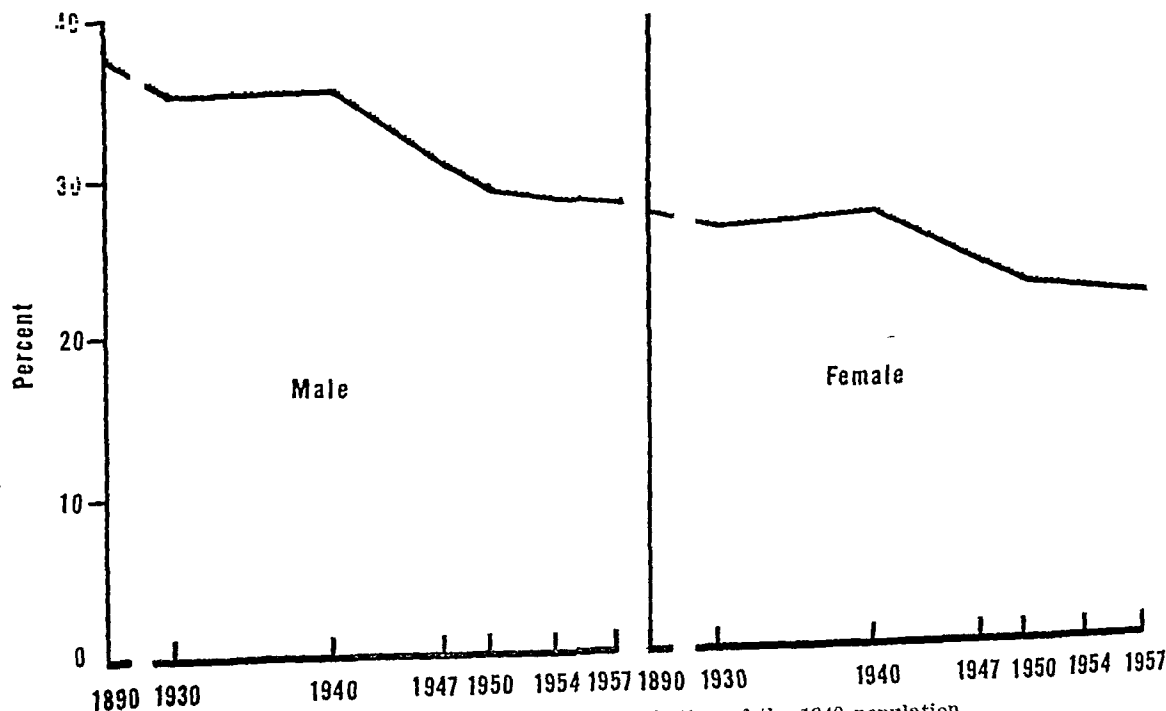
and 1957, all age groups of women 15-44 years of age who were ever married showed a marked increase in the number of children born to them. Moreover, while women with increasing education have fewer children, the proportional gains in fertility between 1950 and 1957 were greater as the level of education increased, excluding those with less than 8 years of schooling and with 4 or more years of college. Also, the proportional increase in fertility in the last 7 years was greater among women aged 15-44 in the labor force than among those not in the labor force (2*c*).

Family Composition

Despite the marked increase in fertility and children born, the average size of families has increased but little and only in the last few years. Average family size, which had decreased to 3.76 persons in 1940, decreased further to 3.53 persons in 1953. By 1957, the average size of families rose to 3.61, although this is still below the level for 1947 (1*f*,2*d*).

The decline in family size up to 1953 is the

Figure 1. Percentage of persons never married, 14 years old and older, by sex, 1890-1957.



NOTE: Standardized for age; based on the age distribution of the 1940 population.
SOURCE: References 1a and 2a.

are rates of separation and widowhood. Divorce rates are lowest for women with 4 or more years of college, and highest for women with 1 to 3 years of high school. The rates of separation for women vary inversely with education (17). In recent years, the proportion of divorces affecting children and the median number of children per divorce involving children have increased (3g).

Illegitimacy is an increasing problem in family life. Between 1940 and 1956, the illegitimacy rate rose from 7.1 per 1,000 unmarried women 15-44 years of age to 20.2. The ratio of illegitimate births per 1,000 live births increased from 17.5 to 19.0 for white persons and 179.6 to 204.0 for nonwhite persons between 1950 and 1956 (9,10). In one study, premarital pregnancy was found to be associated with divorce and with young age at marriage (11).

Basic Problems

While many of the trends in American family life, especially since World War II, may be regarded as encouraging, sight must not be lost of the fact that many social problems thought to be closely related to family life have been increasing. Among these we may list juvenile delinquency, mental illness, illegitimacy, and living conditions and productive opportunities for our elder citizens.

In addition, with the improvement of public health methods in combating the great killers of yesterday, our attention must turn more and more to the prevention and control of chronic disease that saps the will and the physical energy of so many, especially in later years.

A basic step in understanding these problems and effecting preventive techniques lies in a more detailed study of the family as the unit of social, mental, and physical health. Among the research needs concerning the family, mention should be made of at least the following:

1. A statistically useful definition of the family for health and welfare purposes, including all relevant persons in and out of the household unit.

2. Nationwide coverage of marriage and divorce statistics, based on the centralized registration of marriages and divorces in all of the States. Data broadly similar to those obtained

for divorces should be obtained for families broken by death and separation.

3. More intensive study of differential mortality by marital status, age, sex, and race to locate the social and psychological correlates of mortality differences.

4. Intensive studies of health conditions and practices in the family unit as a whole, and of the functions of the family in rehabilitation and in preventing and treating illness.

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growth was among women 45 to 64 years of age (6a,b). In 1955, husband-wife families with the wife in the labor force had a median income of \$5,622, compared with \$4,326 for families in which the wife did not work (5d). The thought is suggested from these and similar data that the erstwhile productive functions of the family unit may be returning in a new institutional form.

From the point of view of family growth, children seem to be less a barrier to the employment of the mother than formerly. The percentage increase between 1950 and 1957 in children born per 1,000 women 15-44 years old who were ever married was 13 percent greater among women who worked, a 30.7 percent increase, than among those not in the labor force, a 17.9 percent increase (2i).

This increase results in part from the greater increase of married women over 35 years old in the labor force, that is, women who have completed or nearly completed their childbearing. The proportion of married women in the labor force decreases with duration of marriage through the first few years, indicating that women leave the labor force during the early years of childbearing (7). Women with children under 6 years of age have a lower proportion in the labor force at all ages than women without children under 6, but the proportion increases among these women as age increases (6c). As the children enter school, mothers tend to return to work, as indicated by the much greater participation of women with children 6 to 17 years of age but none under 6 years old.

A current deficiency in statistics on the family is the lack of data on total family health, but certain indexes from vital statistics data reflect improvements in the health of family members. Between 1940 and 1956, the improvement in life expectancy at birth rose from 62.8 to 67.3 years for white males, and from 67.3 to 73.7 for white females. Although the improvement in life expectancy was greater for nonwhite males and females than for white persons in this period, a marked disparity remains (3c). Infant mortality provides another index, declining from a rate of 47.0 per 1,000 live births in 1940 to 26.0 in 1956 (8a,3d). Maternal mortality offers a similar picture of

marked gains in health for the family: a rate of 37.6 per 10,000 live births in 1940 dropped to 4.1 in 1956 (8b,3e).

Family Stability

The increasing proportion of remarried persons, mentioned earlier, and the increasing proportion of divorced persons suggest a growing problem of family instability. Actually, on the basis of available data, it is extremely difficult to assess the trend in family stability. The percentage of men currently divorced rose from 1.2 in 1940 to 1.8 in 1954; for women it rose from 1.6 to 2.2 in the same period. Between 1954 and 1957, the change in the percentage of persons currently divorced was negligible (1a,2a). The trend in the divorce rate per 1,000 women 15 years old and older through this period gives a different impression. From its highest point of 17.8 per 1,000 married women 15 and over in 1946, the divorce rate declined to 9.4 in 1956 (3f). Divorce trends alone can be misleading in assessing trends in family instability, since they do not reflect the total population of families broken by separation and desertion, from which the majority of divorces arise. Much more detailed study, based on reliable nationwide statistics of family formation and dissolution, is needed before conclusive analyses can be presented.

Divorce has increased in relation to death as a type of family dissolution. While the proportion of currently divorced persons rose between 1940 and 1954, the proportion of currently widowed persons declined in the same period (1a). Comparisons of the trends in currently divorced and currently widowed understate the relative increase of divorces, since proportionately more people who were ever divorced are likely to be among the remarried at a given time than persons who were ever widowed. Most important is the fact that divorce, by and large, affects families relatively early in marriage, while death affects them much later.

Marriages of young persons (women less than 21 years of age) are less likely to be permanent than marriages of somewhat older persons (1k). Divorce rates are considerably higher for nonwhite than for white women, as

Collection of Data on Accidental Injuries

PHILIP S. LAWRENCE, Sc.D.

CONSIDERING that accidental injury is the major cause of death in the United States for the ages 1 to 35 years, there is an obvious need to collect and evaluate data about accidents by methods which may lead to plans for accident reduction.

The U.S. National Health Survey, authorized by Congress in 1957, specifically instructs the Public Health Service to evaluate the methods of gathering data and to facilitate the development of similar data by others, so as to speed the day when the acquired knowledge may be applied.

With this instruction in mind, the following account is offered of our methods of obtaining information on accidental injuries. The magnitude of this one class of morbidity may be judged by the fact that we calculate there were 47 million injuries in a year which resulted in medical consultation, or in restriction of the person's usual activity. Of this number, 40 percent were home injuries.

This calculation is based upon a scientifically designed sample of the population of the United States. The count from the sample was expanded to give a national estimate for which we can measure the margin of error due to the sampling procedure. From among 1,900 counties or groups of counties into which the whole country is divided, 500 are obtained in the first stage of sampling. Further sampling stages yield the final units, called segments, each of which contains about six dwelling units where the interviewer knocks on the door.

Dr. Lawrence, chief of the Household Survey Analysis Section, National Health Survey Program, Public Health Service, presented this paper at the 46th National Safety Congress in Chicago, October 22, 1958.

Interviewing is done continuously throughout the year, but each week's sample is a representative sample of the Nation. This makes it possible to produce weekly estimates of events that occur often in the population, or to combine weekly samples to obtain quarterly or annual estimates for less frequent events or for subgroups of the population.

About 6,000 segments, or 36,000 households containing roughly 115,000 persons, are included in the interviews during the course of 1 year. These households are scattered through every State, but the sample is not designed to produce individual State estimates. One year's data will provide estimates for 12 major geographic sections; for 8 metropolitan areas; or for all of the metropolitan, urban, rural, and rural-farm divisions of the Nation.

The interviews are conducted by 125 interviewers who are under the guidance and supervision of the Bureau of the Census. The data are obtained according to specifications of the Public Health Service. In a program of this kind the question of reliability of the basic data is of primary importance. For this reason numerous controls are built into the program for the purpose of maintaining quality. Interviewers are selected by examination and are further selected and trained in several steps, including group sessions and supervisor's observation of practice interviews. Several times each year refresher courses are given both interviewers and supervisors. Once each month interviewers are given written examinations. The survey also includes, as a continuing procedure, re-interviews by the supervisors of about one-sixth of all households. A final evaluation of interview quality is made at the data-processing stage where errors and omissions by each interviewer are

- (9) U. S. National Office of Vital Statistics: Vital statistics—Special reports. Washington, D. C., U. S. Government Printing Office, Feb. 15, 1950, vol. 33, No. 5, table B.
- (10) U. S. National Office of Vital Statistics: Illegitimate births. May 5, 1958, table 2. (Mimeo-graphed.)
- (11) Christensen, H. T., and Meissner, H.: Studies in child spacing. III. Premarital pregnancy as a factor in divorce. Am. Soc. Rev. 18: 641-644, December 1954.



BCG Vaccination

Although it is generally accepted that the role of BCG vaccination, always limited in the United States, is diminishing even further, some advocates continue to propose more extended use of it. Consideration of current trends in tuberculosis suggests that the proponents of BCG have not given sufficient weight to basic changes in the epidemiology of the disease. One of the most significant of these is that the infection rate has dropped sharply in recent years. There is good reason to believe that, with continuation of our tuberculosis control efforts, the acquisition of new tuberculosis infection in this country may become a rare event.

What now are the disadvantages? Even in the face of grossly diminished need, BCG vaccination would be justified if it offered complete protection. Carefully conducted and controlled studies, here and abroad, yield sharply conflicting evidence on this point. Studies in this country do the least to affirm the usefulness of such vaccination. Not only are there doubts regarding the benefits of BCG, but there are complicating factors as well. Probably the most important is that BCG causes tuberculin sensitivity, making it virtually impossible to differentiate by skin testing between persons who have been vaccinated and persons who have been infected with virulent tubercle bacilli.

Most of our cases in this country today are persons who were previously infected, some many years ago. BCG offers no protection to these people. Indeed, it would enormously complicate the problem of identifying them so they can benefit from other public health measures.

Other problems would result from the general use of BCG vaccine. Any appreciable increase in nonspecific reactions to tuberculin would obscure the measurement of trends of tuberculosis infection, the search for source or index cases, and the selection of groups of younger people for X-ray screening. Also, a valuable tool in differential diagnosis would be lost to us.

Because of the vanishing need for BCG vaccination, its limited effectiveness, and the disadvantages attendant on its use, few health officers will find situations in their jurisdictions where the risk is so high and the exposure so truly unavoidable as to warrant resorting to BCG vaccination.

—RALPH E. DWORK, M.D., *director of health, State of Ohio.*

Our hypothetical interviewer has already asked whether the person has consulted a doctor. She is now ready to find out about other actions taken, and she proceeds with several questions: "Last week or the week before did this injury cause you to cut down on your usual activities for as much as a day?" "How many days?" "How many of these days were you in bed all or most of the day?" "How many days did the injury keep you from going to work?" In the case of a child, "How many days did it keep him from going to school?" Our interviewer then asks whether the person has any of several types of permanent or long-lasting limitations of activity or of mobility. Finally she inquires about the person's hospital experience.

We consider a positive response to any of these questions as a form of disability. In other words, we define "disability" as any temporary or long-term reduction of a person's activity. The criterion of the least severe disability in our data would be 1 full day of restriction of usual activity which did not involve confinement to bed. From this point further degrees of severity of disability can be defined, depending upon whether there were bed days, hospital days, or some type of chronic limitation. School-loss days or work-loss days refer to special population groups, children or persons who usually work.

Information on disability is of primary interest to many people. It is around some concept of disability that programs are often planned and that the economic consequences of ill health or injury are often measured. The word "disability" is not only widely used but has taken on a wide variety of meanings for the purposes of different kinds of programs. I do not want to describe the many different ways by which disability is classified. It is important to note, however, that tabulations which include, or exclude, injuries on the basis of different definitions of disability are almost certain to lead to different estimates of the rate of occurrence of injuries. Reports of injuries by various organizations may all be reliable, but they still may differ because of the sources of data and the definitions employed.

In the National Health Survey interviews, respondents report to us all degrees of injury.

However, we tabulate and publish information only on injuries for which the person consulted a doctor or which caused the person to cut down on his usual activities for at least 1 full day. Injuries of this degree amount to about 56 percent of all injuries or 51 percent of the home injuries that the respondents have told us about. We, as well as others, have been surprised at the large volume of injuries shown in publications from the National Health Survey. Yet these figures include little more than half of the injuries originally reported to us in the household interviews.

What the Survey Can and Cannot Do

From this account of the way in which the survey is conducted and how injuries are measured, it is apparent that there are many questions that cannot be effectively answered by the household survey of the National Health Survey Program.

First, we cannot estimate the number of accidents because we have no way of connecting together several people who may have been injured in the same accident. We can estimate the number of injuries or the average number of persons injured.

Because we use a 2-week recall period we cannot count the number of people who had any given number of accidents during a period of say 1 year. We cannot, therefore, study the question of accident-prone individuals.

The National Health Survey cannot provide any detailed epidemiological information such as the circumstances that led up to the accident, or the kinds of equipment, or names of products that were involved. Epidemiological research of these types can be, and should be, made by smaller, more intensive studies which might employ sources of data other than a household survey.

The survey covers only the experience in the preceding 2 weeks of people who were living at the time of the interview. For this reason the survey cannot supply information about injuries that result in death within a few days of the accident. The kinds of fatal injuries, the amount of hospital and physician care required, and the circumstances of the fatal accident must be obtained from other sources.

routinely tabulated and transmitted to regional supervisors. During other steps of data processing, further controls are applied. For example, all coding of medical conditions is done independently in duplicate. The codes are then compared and differences are corrected.

The Questionnaire

Interviews are conducted with a responsible adult in the home, with the requirements that all adults present at the time must be interviewed for themselves and that no one may be the respondent for any unrelated person. The interviewer does not ask about deceased members of the household. Therefore, we do not obtain data on injuries from which the person died within a few days after the accident.

Assume that an interviewer has called at a dwelling place. She has asked about the composition of the household and has obtained for each member such personal characteristics as relationship, age, sex, race, marital status, and education. She now asks a series of questions to get information about the presence of current illnesses, injuries, chronic diseases, or impairments. Among these questions there are three which are most likely to reveal an injury condition. "Last week or the week before, did you have any accidents or injuries, either at home or away from home?" "Last week or the week before did you feel any ill effects from an earlier accident or injury?" "Does anyone in the family have any of these conditions?" After the last of these questions, the interviewer slowly reads a list which includes impairments such as deafness, serious trouble with vision, amputations, paralysis, and any permanent stiffness or deformity of any part of the body.

These questions result in two types of measurement of accidental injury. One type consists of the prevalence of impairments or aftereffects of accidents that occurred at some time in the past. The other is the incidence, or rate of occurrence, of new accidental injuries within the preceding 2 weeks. To measure the incidence of injury, a 2-week recall period is used. Two weeks was selected as a reasonable time interval during which people can remember the occurrence of acute conditions or

injuries. Studies have indicated that longer recall periods result in loss of information. Since about half of the tabulated injuries in this survey were reported as having occurred "last week" and half the "week before," there appears to be very little memory loss for injuries within a 2-week period.

Assume that the respondent has reported some sort of accidental injury. Our interviewer records the condition and then asks additional questions to define further the nature of the injury. She asks, "Did you ever talk to a doctor about it?" "What did the doctor say it was—did he use any medical terms?" "What kind of injury was it?" "What part of the body was hurt?"

Having defined the kind of injury, the interviewer asks about the time and place of the accident. "When did it happen?" "Where did it happen?" "Was a car, truck, bus, or other motor vehicle involved in any way?" "Were you at your job or business when the accident happened?" These questions permit us to separate accidents which happened in or about the home from other types. They further define whether the accident itself occurred in the preceding 2 weeks or whether the condition reported is an aftereffect of an earlier accident.

Information is not obtained as to how the accident happened. We know at this point, for example, whether it resulted in a burn or a fracture or an amputation, but we do not know whether the immediate cause was an explosion, a fall, or a collision. The kind of information needed to classify accidents by type cannot be accurately obtained from a few brief questions. In our aim to provide a panorama which includes many areas of health and medical care we have had to sacrifice some information on each topic. However, information on the type of accident will be obtained in a future addition to the questionnaire.

Measuring the Effects of Injuries

The principal advantage of the household survey method is that certain types of information can best be obtained from the people themselves. This is true with respect to the effect illness or injury has on their lives and what actions they take in relation to these conditions.

Group medical practice as an innovation depends for acceptance or rejection on how those involved in it perceive it. If these perceptions conflict with the individual's behavior and ideas, there is clearly a need for understanding and action.

Provision of Medical Care

History • Sociology • Innovation

GEORGE ROSEN, M.D., Ph.D.

WHEN the Committee on the Costs of Medical Care published its final report in November 1932, the majority submitted a program with five basic recommendations. The first of these proposed "that medical service, both preventive and therapeutic, should be furnished by organized groups of physicians, dentists, nurses, pharmacists, and other associated personnel. Such groups should be organized, preferably around a hospital, for rendering complete home, office, and hospital care. The form of organization should encourage the maintenance of high standards and the development or preservation of a personal relation between patient and physician" (1). The more sanguine proponents of this course of action felt that group medical practice was a logical and reasonable step toward improved organization and provision of medical care, and that it would spread rapidly. But this did not happen.

Organizations designed to provide medical care through some form of group practice have

developed slowly but steadily in the intervening 25 years. Some have been organized by consumers using the Rochdale principles of co-operation. Others have been created by groups of physicians in noninsured practice, by labor unions, and by groups in the community who wish to make comprehensive medical care available to low- and middle-income groups. A number of these are associated with prepayment plans, notably with the Health Insurance Plan of Greater New York and the Kaiser Foundation Health Plan.

Recently, questions have been raised concerning the slow growth of such plans, and critical views have been expressed on the gap between promise and practice in group medical care (2-4a). These critiques have highlighted certain painful inadequacies and have focused attention on the importance of solving these problems, but the proposed remedies tend to concern themselves with surface manifestations or to dissolve in hortatory admonitions. In a discussion of the quality of medical care at the recent National Conference on Labor Health Services, one participant remarked: "When people leave a group practice program to join a fee-for-service plan . . . the gauntlet has been thrown down to the service plan. There must be reasons for this, because workers generally reflect the degree of satisfaction with the serv-

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We cannot provide clinical or detailed diagnostic data. A respondent probably could not tell us that he had a Colles' fracture of the radius, but he could tell us that he broke his lower arm. Yet detailed diagnostic information might be needed, for example, in a program which aims to develop protective equipment.

Finally, within its present scope, the National Health Survey is unable to obtain estimates of injuries for individual States, counties, or communities. A city which desired to obtain illness or injury information from its own population sample could, however, employ methods of interviewing and of questionnaire design similar to those of the survey.

It is evident that there are many things about home injuries which we are not prepared to answer and which should be answered by other methods or by local research projects. However, there are some types of information that can be more effectively obtained by this survey than by any other present methods or sources.

One distinct advantage is that the national survey can provide information along broad baselines. For some years there has been a tendency to generalize the results of small studies to apply to the Nation as a whole. With a national sample we now have, or will soon have, estimates of injuries and other conditions for the Nation, for major geographic regions, and for a number of urban and rural population groups. The sample not only provides information on ill and injured persons, but on the characteristics of the population in which the cases occurred. This makes it possible to produce rates of occurrence for urban or farm groups; for different educational or income classes; by marital status; by usual activity; or for other subgroups of the population.

Since the program is on a continuing basis,

the survey can obtain time trends for data that have a seasonal or cyclical pattern. The continuing nature of the survey may also be an asset in periodic measurement of health factors that could change as a result of preventive programs, new techniques or increased use of medical care, or changes in national economic conditions.

One other advantage of the household survey method has already been touched upon. This is the capability of ascertaining the effect of the injury on the person's life in terms of disability. Information on disability is important for motor vehicle injuries and for work injuries as well as for those which occur in the home. However, the household survey method is particularly useful with respect to data on home injuries. Information on motor vehicle injuries of certain degrees of severity can be obtained from official reports. Data on work injuries, at least those of an industrial nature, are obtainable from records and reports of industries. Hospitals have certain data on persons who are injured severely enough to come through their doors. But for the great bulk of home injuries there has been no centralized source of information. Many of these home injuries are of a less severe nature, but they nevertheless constitute a sizable part of medical care needs, of lost time from work, and of bed disability.

As time goes on the National Health Survey Program will publish increasing amounts of data on home injuries. It is hoped that these data will be useful to people engaged in safety programs by helping them to assess the extent of the problem, by providing information on various characteristics of persons injured in home accidents, and particularly by stimulating research and program planning in this very important aspect of the health of the people.

Poliomyelitis Packet

A poliomyelitis packet designed to help health departments promote immunization programs is available without charge from the Communicable Disease Center, Atlanta, Ga. Samples of the packet have been sent to State health departments.

groups as well. Nonetheless it remains a phenomenon to be taken into account in studying the development of new methods for providing medical service.

Medical Ideology and Practice

The physician as we know him today in the United States and in other countries is a relative newcomer. The general practitioner is some 200 years old in this country, and about 100 years in Great Britain (5, 6). The 19th century also saw the appearance of the general practitioner in France and Germany out of the fusion and elimination of several categories of practitioners. The modern specialist made his appearance around the fifties and sixties of the last century (7). Most characteristic of these practitioners from a social and economic viewpoint was that they were individual, small entrepreneurs, members of the middle class. As small entrepreneurs, they shared the socioeconomic attitudes and views of other middle-class groups. (Social and economic class as used in this discussion refers to configurations of behavior—occupational or productive activity, life styles, patterns of consumption, political and other belief systems—which exhibit a sufficient degree of consistency to make it possible to distinguish from one another groups in the social organization of a community. This does not imply that social and economic classes are homogeneous layers in a social structure. This is particularly so in the case of the middle class. Initially, in the medieval urban communities a somewhat cohesive social and functional group of merchants, tradesmen, and artisans, it has undergone changes in the course of history. New alignments and tensions between various intermediate economic or social groups have led to such essentially historical designations as the older and the newer middle classes. Among the various component elements of the middle class may be counted middle-size entrepreneurs in industry and trade, small shopkeepers, professionals such as the physician, lawyer, and teacher, and officials and salaried employees. According to the Oxford English Dictionary, the term "middle class" was employed in 1812, and John Wade, in 1833, refers to the "middle classes" (8-13).)

The fact that these practitioners were small entrepreneurs and shared the socioeconomic attitudes and views of other middle-class groups has been most clearly evident in the United States. The social philosophy of liberalism, combining the ideas of Adam Smith and Thomas Jefferson, provided the ideological framework for these attitudes. The task of government was to provide the fundamental security needed for community life, especially the protection of property, but government action was to be kept to a minimum. There was little or no need for a strong central authority, because local government could handle most community problems. As far as possible, it was felt, the individual should be free of regulation and given full scope for individual initiative. While certain undertakings required joint action within the community, each man was held to be entitled to carve out for himself the largest possible stake.

The American physician of the 19th century shared these views with his neighbors and acted accordingly. Each man was sufficient unto himself, except as he adhered to rules of professional behavior established by his colleagues. Competition was accepted as natural and was quite brisk. According to William J. Mayo: "Competitive medicine was the response of the individual physician to his training and environment. It fostered self-sufficiency and jealousy" (14). The physician ran his practice from his office, with little recourse to the hospital or to complicated equipment.

Social Change and Group Practice

Since the end of the 19th century, and to an increasing degree following the First World War, this self-sufficiency has been undermined. The physician and his practice have become inextricably intermeshed with the increasingly complex social organization which exists for the provision of medical care. In this process the hospital has come to occupy a central position. (This association of the physician, particularly the general practitioner, with the hospital occurred to a much greater degree in the United States than in Great Britain or on the continent. For all practical purposes, the general physician has not been a member of the

ice" (4b). And while the speaker conceded that there may be multiple reasons, these apparently derived simply from the lack of "the amenities, the niceties, the timeliness, the promptness, the personal touch," or something desired by the patient. There is no apparent appreciation that such phenomena may be symptomatic of more deeply rooted causes. Furthermore, while this speaker and others dealing with this problem give evidence of an empirical awareness that medical care is a social activity organized in certain institutional forms, there is no reference to the existence of a body of scientific theory and knowledge which may throw light on the problems previously indicated, and perhaps point to ways of mastering them.

Medical care in some form has been an element of group living throughout history, and in all likelihood long before recorded history. Moreover, as a social function it is integrated and interlocked with other elements in the structure of group living of which it is a part, with government, the economy, the family, religion, and others. All human actions must be studied within a framework conditioned by men, with an understanding of men's ideas of the present and hopes for the future. Historical continuity derives from common challenges and purposeful responses to meet these challenges. One such constant has been the continuing search for security from the unpredictable impacts and hazards of ill health and its concomitants. Another aspect of continuity is the human aspiration toward self-fulfillment, the individual's need for self-expression. Such needs may reinforce each other or run counter one to another, thus creating tensions. The result is a variety of actions and reactions under differing circumstances and in widely divergent ideological climates. Yet these actions and reactions provide a pattern which makes possible an understanding of behavior and process. For a major contribution of historical analysis is to penetrate the process of development. Institutions, patterns of behavior, systems of ideas, methods of control—all have developed from something which was there before. The hospital, the health department, fee-for-service medical practice, the theory of animate contagion—all illustrate this truism which is too

often forgotten. For these reasons it may be useful to consider group medical practice in historical and sociological terms, and to see whether historical analysis and sociological investigation may not enhance our understanding of its present condition.

Sociology, History, and Medical Care

The provision of medical service is an activity involving interaction between two or more human beings, thus creating a social system. At the same time, the participants in this system are also members of other larger and smaller social systems, which form the greater part of their environment, and which exert a determining influence on their thought and action. Without knowledge of this environment, the behavior of the physician, of the medical profession, of the patient and his family, and of others involved in the provision of medical care cannot be fully understood and taken into account in changing traditional ways of providing medical care and adopting new forms for this purpose. Within this environment, there is a social order characterized by differential distribution of power, accessibility to ways of earning a living, prestige, and status. The participants in this order have defined roles, specified behaviors considered appropriate to these roles, and values which motivate or are presumed to motivate the participants. Associated with this system, supporting it and interlocking with it, are complexes of knowledge, techniques, beliefs, values, attitudes, norms, symbols, rituals, and customs. Some of these are shared widely in a society; others are the concern of smaller groups.

The medical profession, like other occupational groups, has a body of shared ideas, values, and standards. Members of the profession are expected to orient their behavior in relation to patients, colleagues, and the community at large in terms of norms and values generally accepted and agreed upon. Many of these ideas and behavior patterns have been transmitted from the past and are adhered to even though the situation has changed radically. Adherence to systems of inappropriate or incompatible values and norms is not peculiar to physicians; it is characteristic of other

for the development of self-reliance and the achievement of success. Under the impact of expanding industrialism in the United States, the medical profession joined other middle-class groups in accepting this philosophy and applying it to questions of public health and medical care. Theoretical justification for refusing to use tax funds for the expansion of public health work, or for the provision of medical care and other aid to the poor, was sought in the Darwinian theory of evolution. Disease was a special case of the struggle for existence, and one of the means by which the fittest survived (20).

Today, the principle of State intervention and control in health matters is generally admitted, although variations may exist in practice due to the greater or lesser efficiency of the intervention and in the greater or lesser frankness with which the role of the State is admitted. Its emergence has come from the interaction of important economic and social trends. For one thing, during the period from the end of the 19th century to the present, the trend of economic organization has been the continuous and progressive replacement of smaller units by larger ones. The further this process advanced the more untenable has become the conception of noninterference by the State. But while other elements of the middle class, for example, the small businessman, sought protection against the large producer and competitor through government action, the medical profession was able to continue relatively untouched by change in the privileged sanctuary of private practice. And for the most part its ideology has remained intact.

The *Chicago Medical Journal and Examiner* wrote in 1879: "It is frequently stated that the poor should be protected by the government against the causes of disease which are said to infest the habitation of the lower classes. . . . It is the lazy people and their sentimental friends who are always calling for government aid. If now you undertake to protect this fraction of the community, you have to protect it against the consequences of idleness, luxury, intemperance and vice—thus interfering with the operation of the wholesome monitory laws of nature; and you do it at the expense of the meritorious classes of society. Having accus-

tomed such worthless people to rely upon government for protection against smallpox, and scarlet fever, and syphilis, and diphtheria, and sewer-gas, and scabies, it will not need the passage of many generations before they will demand protection by the government against the cold and hunger and nakedness for which they should themselves make provision" (21).

The same gentle spirit still pervaded the editorial views of the *New York State Journal of Medicine* in 1949 (22, 23): "Any experienced general practitioner will agree that what keeps the great majority of people well is the fact that they can't afford to be ill. That is a harsh, stern dictum and we readily admit that under it a certain number of cases of early tuberculosis and cancer, for example, may go undetected. Is it not better that a few such should perish rather than that the majority of the population should be encouraged on every occasion to run snivelling to the doctor? That in order to get their money's worth they should be sick at every available opportunity? They will find out in time that the services they think they get for nothing—but which the whole people of the United States would pay for—are also worth nothing."

Heresies

From the last decades of the 19th century to the present day, a variety of "heresies" in the financing and organization of medical care have been opposed with ideological weapons obtained from this philosophy. Dispensaries, free public clinics, contract medical schemes, and prepayment medical care plans have all aroused opposition and have been met with similar arguments. The abuse of medical charity agitated physicians and their organizations from the 1880's onward (24, 25). Allegedly, free clinics for the poor were being used by others less deserving of charity, who would consequently be "pauperized." To the concern with free clinics and their effects was soon added the problem of contract schemes, and just before the First World War came the movement for national health insurance. These innovations were opposed on the ground that they subsidized the inefficient and the lazy, they destroyed the personal relation between physician and patient, they decreased professional com-

hospital staff in Britain or in countries such as Germany, Austria, or France. The movement to exclude the general practitioner from American hospitals is a recent development and has led to various countermeasures.)

The practitioner must depend on expensive equipment, as well as on specialists and technicians for diagnosis and treatment. The situation was strikingly illustrated by Dochez in a comparative picture of the complex changes wrought in medical practice over three decades (15). He contrasted the histories of two patients with similar types of heart disease; one was recorded in 1908, the other at the same hospital in 1938. The total written record of the first patient occupies 21½ pages and the observations represent the combined efforts of 2 physicians, the attending and the house officer, and of 1 specialist, the pathologist-bacteriologist. The record of the second patient, who was still in the hospital when Dochez made this comparison, comprised 29 pages and represented the combined observations of 3 visiting physicians, 2 residents, 3 house officers, 10 specialists, and 14 technicians, a total of 32 individuals.

Today, the medical practitioner must have some hospital connection, both for his patients and for himself (16-19). The fledgling physician is no longer apprenticed to another physician, but to a bureaucratic institution, the hospital, where he serves as intern and resident. Furthermore, he must depend on relations with other medical men to get started in practice and to keep a clientele. Throughout his career, hospital appointments are crucial to his practice and to his advance in some medical hierarchy. To a considerable degree, the referral mechanism is controlled by informal cliques in hospitals. At the same time there has been an increase in the number of ancillary occupations filled by persons on a salaried basis. One major consequence of this system has been to narrow the area of practice (the market) of the general physician, and to imply, often correctly, that he is not competent to handle a number of types of illness.

These trends and facts underlie the behavior of physicians in relation to various forms of prepaid and organized medical care: Blue Cross, Blue Shield, prepayment group practice plans, hospitals, union health plans and cen-

ters, and above all, government action in the health field. Viewed and interpreted sociologically, the behavior of a large part of the medical profession represents the reaction of a segment of the older middle class to the process which is compelling it to come to terms with modern industrialized society. To use an analogy, one may say that medicine is experiencing its Industrial Revolution, and that the medical practitioner is being brought into the "factory" (the hospital and the whole complex organization for the provision of medical care), where he is being subjected, on a privileged basis, to the requisite "labor discipline."

Competition and Survival

The entire profession and its field of action are undergoing change, but different kinds of practitioners face varying situations. The general physician endeavors to keep hospitals, specialists, and other organizations and individuals concerned with medical care from competing with him and limiting the area of his activity in ways which he considers unfair. This aim is implicit in the establishment of the Academy of General Practice, of general-practice departments in hospitals, in the idea of an American Board of General Practice, and in the opposition to review and control of the quality of medical care offered by prepayment organizations and welfare funds. The general situation also affects the specialist, who wishes to maintain the status quo so that his privileged position will not be altered. He endeavors to render ineffective any threatened competition. Considerations of this kind, whether overt or covert, are involved in the insistence on free choice of physician, on fee-for-service practice, and in all the other battle cries that have echoed on the medical care battlefields for more than four decades.

But while the self-sufficiency of the physician as entrepreneur is undermined by the march of science, technology, and social organization, the ideology of competition and rugged individualism still remains the uncompromising official creed. According to this ideology, the solitary individual, endowed with personal merit, makes his way against others in the open market. The effort involved in this competitive process provides, it is believed, the condition

adequate capital resources might not have been available. After all, the Health Insurance Plan started with loans from several foundations, and it is noteworthy that the only other group practice plan of comparable size (Kaiser Plan) started on an industrial base. Furthermore, are there any inherent limitations in group practice as an organizational form? The answer must be that we do not know.

Nonetheless, there are hints from investigations concerned with the sociology of bureaucratic organizations. Some of the problems brought about by the size of an organization have been studied. Tsouderos, for example, in examining 10 voluntary organizations, found that the introduction of more formal procedures and greater specialization of function, as organizations grow, tends to alienate a number of individuals (29). The emergence of a heterogeneous membership can also be an outgrowth of the increasing size of an organization. Such a development carries with it the probability that the members will have dissimilar views on various matters. This in turn can lead to a decrease of consensus (30). However, none of these studies has been concerned with medical care plans, and one may suggest that group practice could be a fruitful area for research.

Role Performance

By virtue of the process of socialization, the physician acquires a scale of values, a set of attitudes, and a way of thinking and acting which is distinctive in various respects. Some of these are traditional and represent the "conventional wisdom" (to borrow a term from J. K. Galbraith's book, *The Affluent Society*) of the medical profession. As part of this process, there develops a professional self-image, a definition of the physician's role, which enables him to carry out his obligations under a variety of circumstances. In some environments, the performance of this role is more visible than in others and consequently more easily available for control (31). The physician in his private office is subject chiefly to the controls of the professional values and norms, to his concept of himself as a professional person, and to what he considers good practice.

These controls are buttressed in varying degree by sanctions both within and outside the profession, such as expulsion from a medical society or a malpractice action. Otherwise, the physician in his office is not very visible in performing his role, except to patients usually unequipped to pass sound judgment on his action in technical terms.

Some environments are so structured that the practitioner is under the continuing scrutiny of others who appraise the way in which he performs his functions. This is true of the hospital, with its requirements for records, arrangements for staff conferences, consultations, and other accepted responsibilities. What is true of the hospital can apply equally in a prepayment group practice plan or in a labor union health center. In such organizations, the practitioner's behavior not only is visible to his colleagues, but is or may be scrutinized by prepayment plan officials or welfare fund administrators. Furthermore, there may not be agreement on the standards by which performance is judged. In any event, what exists in these organizations is a mechanism for social control which makes him subject to pressures of various kinds. Where the limits of observability in the medical situation are to be drawn is not easily determined, but it should be obvious that physicians strongly imbued with an individualistic ideology will not easily accept the controls involved in more complex types of medical care organization. (The problem is not limited to the performance of physicians and others involved in the provision of medical care. Similar problems confront members of the teaching profession (32).)

This thesis is based on Robert Merton's concept of the role-set, that is, the "complement of role-relationships in which persons are involved by virtue of occupying a particular social status" (32). In the case of the physician and his status, this entails not only the role of a practitioner vis-a-vis a patient, but also an array of other roles relating him to his colleagues in a medical group, to nurses, laboratory technicians, health plan administrators, medical societies, and the like. The relationships physicians have with persons in each of these positions are by no means identical, and involve situations calling for differing attitudes

petence, they were unethical, and similar arguments which still ring familiar.

It is clear that not all physicians shared the official view. For example, in 1889, J. L. White proposed a prepayment plan by which physicians would contract to provide services, emphasizing preventive care, for families for an annual fee (26). The following year a prepaid medical care plan was actually initiated in Chicago by J. K. Crawford and Oscar DeWolf, but the Chicago Medical Society condemned the two physicians (25b). Later, a small group in the American Medical Association also favored compulsory health insurance, but they could do little in the face of the dominant opposing view (27). To a certain extent, such innovating individuals and groups have been favored by periods of rapid social change and reform. This was true during the first decade of the 20th century, the era of progressivism, and to a certain extent during the New Deal thirties.

Under the threat of a national system of health insurance, voluntary health insurance has developed and spread. At least in principle, the American Medical Association has accepted prepayment group practice. Furthermore, a large part of the medical profession, about one-third, today works wholly or in part for salaries (in hospitals, medical schools, for other physicians, government agencies, unions, and pharmaceutical companies).

Continuing Tradition

Nonetheless, the emphasis is still on individual responsibility for medical care, fee-for-service solo practice, and free choice of physician. And even though the medical practitioner may not wholly subscribe to the philosophy, policies, and practices of the professional groups that represent him or speak in his name, he cannot help but be bound by these rules, at least in some measure, whether or not he is aware of this.

In becoming a member of his profession, the medical practitioner undergoes a process of socialization, involving not only the acquisition of knowledge and skills, but even more significantly, perhaps, the acquisition of the values, attitudes, and behavior patterns that enter into and make up the physician's role. Even when the practitioner deviates from the

dominant values, attitudes, and behaviors of his profession, he rarely breaks completely with them. In considerable measure, his relations with his patients may still be determined by these elements, even when he practices in a different setting, for instance, in a medical group. Numerous elements of his role will still be appropriate in this new setting; others, however, are either totally or partially dysfunctional. As a consequence, working in a group practice setting requires changes of attitude and behavior resulting from the acquisition of new goals, reference groups, and relations with colleagues, patients, and other involved persons and groups.

Some forms of change are socially approved. Physicians, for example, are expected to keep abreast of new developments in medicine and related fields so that medical practice can be carried on at the highest possible level. Even here, tradition may exert a restraining influence. Change in the provision of medical care is not generally sanctioned by the groups that set the rules for medical behavior; indeed, it has occurred against strong opposition. Unless there is some compelling reason, change is not easily or lightly undertaken in such a situation by any group of people. During the Second World War, a considerable number of younger physicians in military service were apparently interested in group practice upon returning to civilian life (28). As is well known, however, they did not flock into group practice. While a number of factors were involved in this development, it appears likely that many of these physicians simply took the traditional path because it was easier, coinciding as it did with several other developments, among them, economic prosperity, a rise in the standard of living, social disapproval of nonconformity, as well as legal barriers to prepayment group practice. (This is an interesting problem for social research.)

Here one may ask: Would group practice have increased more rapidly had these conditions not existed? Obviously, such a question is difficult, if not impossible, to answer. Group practice requires the investment of capital to begin with, and that it be available when needed. It may be that even if the physicians had wanted to organize group practice units,

others will see the group practice in the same way. Yet the actual members, the patients, in a group practice plan are more likely than not to be a heterogeneous group—teachers, firemen, machinists, government workers, bus boys, and so on—with diverse expectations and attitudes in terms of past experience, educational background, ethnic origin, social class, and the like. In HIP for instance, it was assumed on rational grounds that it would be more advantageous to all concerned to provide medical care through medical group centers. Yet, the only concrete experience that many workers have had in receiving care from anything resembling such a center is in clinics and outpatient departments of hospitals, of health departments, and similar agencies. Such services still have a “charity” connotation, or at least a lower status association for many people. Experiences in such facilities explain also “why outpatients feel like outcasts” (47). For such people, to receive care in a physician’s private office is a step upward, and any move to bring them into a situation such as prepayment group practice with medical care provided in a facility which can be related to the objectionable clinic will be resented. Naturally, this does not apply to all, but there are enough people to whom it does apply and who make themselves heard. One may suggest that this is one of the factors behind the dual choice arrangement now offered by the Kaiser Foundation Health Plan and by the Health Insurance Plan of Greater New York. In short, the definition of the situation by the patient cannot be assumed to coincide automatically with that of the physician or of the health plan administrator. They may even run counter to one another.

Conclusion

Like the public health and social welfare movements, the movement for prepaid medical care in the United States was originally conceived and implemented chiefly by middle-class people, even though intended to benefit members of a lower social class. Motives of social amelioration propelled to action the proponents of such schemes as prepayment group practice, who were acutely aware of the economics of medical care and the social consequences of lack of care. Furthermore, members of the middle

class are future oriented, prepared to forego present satisfactions in order to achieve future goals (48). Great value is placed on health as a means to an end, and the use of rationally calculated means to reach such a goal. Small wonder, then, that financing and administration have been the major concerns of the movement for increased and improved medical care. This is clearly evident in the otherwise excellent volume, *Readings in Medical Care*. But just as the Sabbath is made for man, so medical care is financed and organized to provide service to people, who whether one likes it or not are not all alike and do not all share the same goals, values, and norms. The health education program of the Health Insurance Plan, for example, is based on a recognition of this premise (49, 50).

Only recently, however, has there appeared an explicit awareness of the central relevance of social science for the provision of medical care. Patients, physicians, administrators, union leaders—all have certain value orientations, behavioral characteristics, class memberships which are important factors in determining how medical care programs operate and what their outcome will be. The closer to the habitual the more easily accepted. Group medical practice as an innovation depends for acceptance or rejection on how those involved in it perceive it. If these perceptions conflict with the individual’s behavior and ideas derived from his class position, there is clearly a need for understanding and action. Certainly, this is an area for research and the implementation of the resulting knowledge.

This analysis has touched on a number of points and has endeavored to indicate a framework—historical and sociological—within which group medical practice must be seen, if its problems are to be understood. There is a full awareness on my part of the possibility and the need for even more intensive analysis of various points. However, as the objective of this analysis is solely to call attention to important dimensions of the medical care problem and to stimulate thought and action concerning the ways in which significant contributions might be made to improved medical care, there is plenty of opportunity to occupy the energy and ingenuity of others.

and behavior. Patients, for example, will differ from physicians in their expectations of the medical practitioner to whom they come for care. Furthermore, not all those in the particular role-set are involved in the same way or in the same degree, and it is important to know what various participants in a role-set bring to it.

Social Class and Therapy

Ideally, the role performance of the physician in relation to a patient centers in impartially serving the patient's health needs regardless of any liking or antipathy he may have for the particular individual. Like all ideals, however, it is only approximated in reality; and this is true in solo practice as well as group practice.

The practice of medicine is affected by the social class system. That the physician is a member of the middle class has already been pointed out, and whether or not he is aware of it, much that he does is influenced by the element of social class. A number of studies in the United States and in other countries highlight the significance of class considerations. Diagnostic and therapeutic decisions, for example, are influenced by the social distance between the practitioner and the patient. Some physicians are either intuitively aware of this factor or have learned by experience to take it into account. In many instances, however, there is no awareness of the distance separating physician from patient, and consequently no attempt is made to narrow this gap.

Aubrey Lewis has pointed out that the psychiatrist and his patient usually share the same subculture, and can therefore define the situation and the problem in a mutually acceptable manner (33). This point has been made more explicit by a number of empirical investigations, which show that patients with mental illness who most nearly approach the practitioner's social class are likely to receive psychotherapy rather than organic therapy or no treatment and are more likely to be considered hopeful from a therapeutic viewpoint (34, 35). Williams has called attention to the need for taking into account the class premises of the patient. If this is not done in psychiatry, dif-

ferences in the perception of problems and their solution may lead to incorrect diagnostic conclusions (36).

Class perceptions and values of the patient may likewise affect practitioner-patient relations. In Regionville, for example, Koos found that members of the lower class felt that physicians were not particularly interested in them as patients. He further reported "a lack of communication between the physician and his patient. Part of this lack was due, no doubt, to the fact that physician and patient too often represent differing subcultures, and 'speak different languages'" (37-39).

Such observations are not limited to the United States, but have been reported from other countries, such as England and France (40, 41). Furthermore, members of the lower social class are less likely to use child health clinics, have their children immunized, or use medical care services when they are members of a prepayment plan. Differences of this kind are likely to be accompanied by differences in expectations concerning illness and therapy. Persons in lower income groups, especially families of unskilled workers, are subject to a number of limitations which affect their behavior with respect to preventive medicine and medical care. For one thing, the horizon of this group is severely limited by fear, ignorance, and misunderstanding, as well as by different types of reaction to life situations. This is true not only of health (42, 43). There is some evidence to suggest that the unskilled English worker feels that his ability to influence the course of events is severely limited. Consequently, there is less stress upon the individual's responsibility (44a). Furthermore, actions are confined generally to the needs of the moment, and the future is allowed to take care of itself. Working class families also tend to be suspicious of authority, and the official health agency may personify this (44b, 45).

Orientation to upward mobility may be another factor which affects the patient's reaction to medical care organization. For example, proponents of group practice feel that this way of providing medical care simultaneously meets the needs of both patient and physician (46). Behind this idea is the implied premise that patients, physicians, administrators, and

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Methodology Research Award

The deadline for nominations for the Eighth Kimble Methodology Research Award is June 1, 1959. The award, \$1,000 and a silver plaque, is given annually in recognition of the application of scientific knowledge to the public health laboratory.

Candidates from the United States, its Territories, and Canada will be considered. They may be nominated for making a fundamental contribution which serves as a baseline for the development of diagnostic methods within the province of a public health laboratory or for the adaptation of a fundamental contribution which makes it useful in a diagnostic laboratory.

The Kimble award, established by the Kimble Glass Co. of Toledo, Ohio, and sponsored by the Conference of State and Provincial Public Health Laboratory Directors, will be presented at the annual meeting of the conference in Atlantic City, N.J., in October 1959.

The rules governing nominations can be obtained by writing to Dr. E. T. Bynoe, chairman, nominating committee, Kimble Award, Laboratory of Hygiene, Department of National Health and Welfare, Ottawa, Ontario, Canada.

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account for more than 60 percent of the increase in the total estimate for 1956. Medical care expenditures are 5.2 percent of all personal consumption expenditures in the revised series as compared with 4.5 percent in the old series.

The revisions are the result of new benchmarks and newly applied techniques for estimating personal consumption expenditures, and indicate changes in the distribution pattern of personal consumption expenditures. A detailed description of the technical aspects of the new series will appear in the Department of Commerce publication.

The revisions for commodity categories, such as drug preparations and sundries, and ophthalmic products and orthopedic appliances, are based on new Census of Manufactures and Census of Business benchmark material for 1954 and census survey data for 1950 and 1956, in place of the former preliminary extrapolations of the 1947 benchmark data.

Service categories, such as physicians and dentists, are now based on current Internal Revenue Service data for gross receipts in tax returns for the period 1953-56, in place of extrapolations from earlier income figures.

Medical care as a percentage of the consumer dollar, that is, the dollar spent for goods and services, increased considerably between 1929 and 1957, but at an uneven rate. Reduction of economic activity in the depression years was reflected in a drop in the dollar volume of expenditures for medical care from \$2.9 billion in 1929 to just under \$2 billion in 1933, although the proportion of medical care to total personal consumption expenditures increased from 3.7 percent to 4.3 percent. From 1933 to 1948, the proportion vacillated between 4.0 and 4.3 percent, then began a steady rise. By 1957 medical care represented 5.3 percent of the consumer dollar, a rise to 140 percent of the 1929 ratio of 3.7 percent and the highest percentage on record.

Personal consumption expenditures for medical care by type of product, current and old series, for selected years, 1929, 1933, 1948, 1950, 1952-57¹—Continued

Expenditures	1929 ²	1933 ²	1948	1950	1952	1953	1954	1955	1956	1957
	Percentage distribution									
Total: Current series.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Old series.....			100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Drug preparations and sundries.....	20.6	21.6	18.9 18.4	19.7 17.0	20.2 16.7	19.3 16.0	18.1 15.4	19.3 15.5	20.4 15.6	20.6
Ophthalmic products and orthopedic appliances.....	4.5	4.6	5.6 5.8	5.6 5.8	5.7 6.0	5.5 5.7	5.0 5.3	5.3 5.1	5.8 5.1	5.8
Physicians.....	32.6	31.1	30.0 29.8	27.8 29.4	26.1 28.5	25.7 27.9	26.1 27.5	24.9 27.2	24.7 27.0	24.5
Dentists.....	16.4	13.9	11.6 11.3	11.0 10.5	10.8 9.6	11.1 9.3	11.8 9.2	11.8 9.0	11.6 8.8	11.3
Other professional services.....	8.5	7.0	5.7 5.7	5.5 5.8	5.3 5.6	5.3 5.5	5.3 5.5	5.1 5.4	5.0 5.3	4.9
Privately controlled hospitals and sanitariums.....	13.7	18.3	20.9 21.5	23.3 23.9	24.4 25.5	21.6 26.1	24.8 26.9	25.2 27.7	25.0 28.5	25.8
Medical care insurance and hospital insurance.....	3.7	3.5	7.2 7.4	7.2 7.7	7.4 8.1	8.5 9.5	8.9 10.2	8.5 10.1	7.5 9.7	7.1

for 1952-56 from U.S. Office of Business Economics: Survey of Current Business, National Income Number, July 1957, table 30, p. 21. New series from U.S. Office of Business Economics: U.S. Income and Output, 1959, table II-4, pp. 150-151.

Personal Consumption Expenditures for Medical Care

Estimates of personal consumption expenditures for medical care items have been revised by the National Income Division of the Office of Business Economics in the Department of Commerce. The expenditure figures, which have been revised back to 1948, are being issued early in 1959 in U.S. Income and Output, a special supplement to the *Survey of Current Business*. They will appear in table II-4 in place of the previous table 30.

Below and on the next page are tabulated the personal consumption expenditures for medi-

cal care by type of product, in dollars and in percentage, for 1929 and 1933, which are unchanged; for 1948, 1950, and 1952-56, which have been revised; and for 1957, which are in the current series.

For 1956, the revised total of personal consumption expenditures for medical care is almost \$2 billion higher than the earlier total. Of that increase, \$1 billion, or more than 50 percent, is the result of upward revisions in estimates for drugs and sundries expenditures; \$600 million, or 31 percent, for dentists; and \$200 million, or more than 10 percent, for ophthalmic products and orthopedic appliances. Drugs and other commodity categories in the medical care expenditure estimates together

This material was prepared by Lucy M. Kramer, research analyst in the Division of Public Health Methods, Public Health Service.

Personal consumption expenditures for medical care by type of product, current and old series, for selected years, 1929, 1933, 1948, 1950, 1952-57¹

Expenditures	1929 ²	1933 ²	1948	1950	1952	1953	1954	1955	1956	1957
	Amount (in millions of dollars)									
Total: Current series.....	\$2, 937	\$1, 983	\$7, 749	\$8, 741	\$10, 172	\$11, 072	\$11, 925	\$12, 827	\$14, 048	\$15, 051
Old series.....			7, 385	8, 376	9, 397	10, 107	10, 603	11, 273	12, 106	
Drug preparations and sundries..	604	427	1, 466 1, 358	1, 719 1, 406	2, 058 1, 569	2, 137 1, 615	2, 163 1, 631	2, 473 1, 747	2, 869 1, 885	3, 098
Ophthalmic products and ortho- pedic appliances.....	131	92	431 427	486 479	580 561	604 577	595 566	685 572	814 612	873
Physicians.....	959	617	2, 327 2, 203	2, 427 2, 435	2, 657 2, 676	2, 840 2, 815	3, 109 2, 913	3, 189 3, 070	3, 470 3, 269	3, 693
Dentists.....	482	276	960 833	961 869	1, 098 906	1, 234 943	1, 406 975	1, 508 1, 017	1, 625 1, 070	1, 705
Other professional services.....	250	138	445 423	482 476	544 529	586 559	634 583	653 610	697 646	734
Privately controlled hospitals and sanitariums.....	403	363	1, 621 1, 591	2, 037 1, 975	2, 486 2, 398	2, 729 2, 635	2, 962 2, 857	3, 229 3, 123	3, 518 3, 451	3, 884
Medical care insurance and hospi- tal insurance.....	108	70	559 550	629 636	749 758	942 963	1, 056 1, 078	1, 090 1, 134	1, 055 1, 173	1, 064

¹ Current figures in roman type; old series in italics. ² Estimates unchanged prior to 1948.

SOURCES: Data for 1929 and 1933 and old series for 1948 and 1950 from U.S. Office of Business Economics: National Income, 1954 edition, A Supplement to the Survey of Current Business, table 30, pp. 206-207; old series

APHA CONFERENCE REPORT

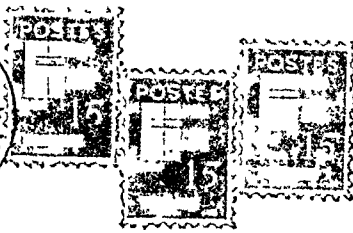
SUMMARIES OF SELECTED PAPERS
from the 86th annual meeting
of the
AMERICAN PUBLIC HEALTH ASSOCIATION
and related organizations
held at St. Louis, Mo.
October 27-31, 1958

Consolidation for Strength

Public health agencies in defining public health criteria and procedures are not keeping pace with the new developments. Thus, there is an increasing tendency toward splintering public health responsibility and authority and the dispersion of essential services to various existing or newly created agencies. If this trend continues it will undermine the influence of professional public health leaders and destroy the unity of health programs necessary to effectiveness. In order to meet this basic challenge, the public health profession needs to augment its strength as a whole with emphasis on particular areas of activity. In my judgment, it is essential that we restudy the strategic position of public health and shape our programs to increase their influence on public policy and counteract the trend toward scattering responsibility. . . .

In many cases in the past support and protection for health programs have been obtained largely by personal and emotional appeals. For example, the people have faith in the health officer as an individual and move to his aid when he needs the pressure of public opinion. Such emotional appeals are uncertain of results and likely to be transitory in their effect. We must develop on a sound scientific basis continuing programs of public relations and health education that will be effective in advancing health services on their own merits.

ROY J. MORTON, C.E.
President, American Public Health Association
From the presidential address, October 28, 1958



A Vessel for Chiloe

We are taking steps to obtain an 80-foot vessel to serve as a marine clinic for some 40,000 people who live on remote islands or inlets in Chiloe Province.

The province, 650 miles south of Santiago, Chile, has one of the country's highest general and infant death rates. About 25,000 of its inhabitants live in small towns on the mainland.

A doctor, a dentist, and sanitation aides use a 50-foot boat, purchased by the National Health Service 2 years ago, to visit some 15,000 others living in sheltered inlets or on nearby islands. But most of the people are receiving no care. Only a larger craft, with quarters for a crew and medical staff, can travel for several days through the rough seas and stormy weather of latitude 40° S. to reach these islands.

—G. HOWARD GOWEN, M.D., *chief public health adviser, U. S. Operations Mission, Chile.*

M.D.'s for Vietnam

Despite formidable handicaps, the medical school of the University of Saigon is training increasing numbers of the physicians Vietnam needs. The country has only 350 for its 12 million people; of these, 160 are in government service, 160 in military service, and 30 in private practice.

When Vietnam was partitioned in 1954, the mixed faculty of medicine and pharmacy moved from Hanoi, where its main physical plant was located, to Saigon. Classes were scattered to temporary quarters in 17 different locations in the city. Enrollment soared, reaching more than 500 students, too many for the school's permanent teaching faculty of 30.

Assistance from the U. S. Operations Mission has been concentrated on increasing the teaching staff and providing adequate physical facilities. Young faculty members receive fellowships to study abroad to prepare for teaching careers in medicine. Visiting professors from the United States come to

Saigon to assist in developing understaffed departments. The Vietnam Government agreed to defer some young physicians from their obligatory military service immediately upon graduation so that they can accept fellowships, and when they are inducted later, to assign them, as their military duty, to teach at the medical school.

The 6-year curriculum was changed to allow for a regular internship in the 5th year and a rural internship at a provincial hospital in the 6th year. A contract to construct a Saigon medical center, with a basic science building and a teaching hospital, is being negotiated.

—CRAIG S. LICHTENWALNER, M.D., *public health physician, medical education project, U. S. Operations Mission, Vietnam.*

The Engineer

The water supply system of Manaus, Brazil, a city of 100,000 at the fork of the Amazon and Negro Rivers, has been under reconstruction under Serviço Especial Saúde Pública auspices for many years. Because funds for the work came from third parties, progress was irregular. Most of the money was spent on pumping and distribution facilities. Water treatment could not be started until distribution was widened, enabling the system to increase its rates and, consequently, its income.

However, 6 months after the city hired a competent engineer and gave him the authority to operate the system, water revenues tripled and they continue to increase. The system will soon be paying for itself.

—E. ROSS JENNEY, M.D., *chief, Health and Sanitation Division, U. S. Operations Mission, Brazil.*

Salt Monopoly

The Bank of the Republic, which holds the salt monopoly in Colombia, is contributing to food research. Bank officials in compliance with a decree will give one centavo from the sale of each pound of iodized salt manufactured and sold in Colombia to the National Institute of Nutrition. The institute will use the funds, which may total 3 million pesos annually, to improve the nutrition of the Colombian people.

—VERNON B. LINK, M.D., *director, Public Health Division, U. S. Operations Mission, Colombia.*

suburbs and rural-urban fringe areas, an absence of adequate building code standards means that the slums of the future are being built now.

- About 27 percent of the annual housing output has been constructed by do-it-yourself builders. Most of this building is the poor man's response to high construction costs. However much these efforts stir one's admiration, it must be admitted that they now add appreciably to the difficulties of assuring proper standards of design, location, and construction. They present a difficult and delicate problem that has been largely neglected.

- Local taxes and debt have increased phenomenally. Taxes in suburbs and fringe areas are now commonly as high as or higher than the tax rates in central cities or large suburbs with full complements of public facilities and services. The outstanding local government debt increased 107 percent for 1950-57.

- In suburban and fringe localities, tax bases are markedly disparate. Some local government units must tax according to a property tax base consisting almost entirely of modest housing, while across a boundary line another government unit is profiting from a major shopping center or industrial plant. Very little benefit accrues to the former government units from the proximity of shopping centers or industrial plants. This result is a direct consequence of the "Balkanization" of local governments in metropolitan areas. In 1957, the 174 standard metropolitan areas (6 were added since 1950) had 15,658 units of local government, an average of 90 per metropolitan area.

- Plans have been inadequate for the development of parks, playgrounds, forest or wildlife preserves, public beaches, and libraries. Land has not been reserved for these uses at a time when one of the principal forces contributing to urban dispersal is the increase and wider distribution of leisure time.

- The landscape has been butchered by bulldozer, chain saw, short-sightedness, inexperience, public apathy, and commercial cupidity.

Warnings

Woodbury added three warnings as guides in the consideration of these matters. Dispersal, he said, is not the cause of growth problems. It is an active factor, but more pertinent are our antiquated systems of local government finance, the irrational hit-or-miss character of governmental structures in metropolitan areas, high construction costs, neglect of ways and means to facilitate the education of in-migrants in the difficult processes and manners of urban living, and the common neglect and downgrading of local public issues, he declared.

The faults of current urban dispersal, Woodbury said, are not inherent in the process itself, but arise from the planless, shortsighted, stupid ways in which much of it is carried on. The tragedy, he commented, is that most migrants to the suburbs are realizing only a part of the gains they might make and at costs many of which either are not necessary or are unnecessarily high.

But the alternative is not, as some advocate, relatively high-density, largely apartment-type development, he said, adding that this would be a 19th century solution and inappropriate to our times.

Microbes Wed to Wastes By Selective Process

Almost every water pollutant can be degraded by one form of microbe or another, but selecting the right microbe is not an easy matter, declared Dr. Paul W. Kabler, chief of microbiology, Robert A. Taft Sanitary Engineering Center, Public Health Service.

Selection, he said, takes place by fortuitous matching of potentially competent micro-organisms with appropriate waste materials. Further adaptations are accomplished by

producing necessary new enzymes either through activation of latent characteristics or through genetic changes that arise spontaneously or by stimulation from environmental factors.

Kabler pointed out that the new industrial wastes joining soil or aqueous environments are confronting organisms with chemical entities in concentrations and under conditions not previously known. With some of the newer organics, Kabler said, selection of the proper organism has not yet been completely successful, but there appears to be no reason why suitable organisms should not be found if the search is sufficiently diligent.

Artificial and natural purification, Kabler observed, are accomplished by the combined metabolic activities of a number of species and variants selected and adapted from an infinite number of micro-organisms and micro-environments existing in nature. Adaptation, he explained, is a function of the microbes' ubiquity and the activity of those best suited to a given environment; those less suited lie dormant waiting for the right environment.

Enzymatic adaptations, he said, are not usually retained by an organism when the compound is removed from its environment, and the transfer of adaptive qualities in one generation to the next does not involve changes in the genetic pattern. Each cell has the genetic ability to produce the enzyme but does so only when the stimulating material is present. The elaboration of an enzyme when it is useful and the ability to grow without it when it is of no value appear to be the basis for much of the on-the-spot adaptation of microbes, Kabler averred.

Radar and Rocket Fuel Pose Few Hazards

The biological effects of microwave energy emanating from radar sets and the toxic effects of rocket fuels were discussed in the context of oc-

The APHA Conference Report

With the assistance and cooperation of the authors, the staff of *Public Health Reports* has summarized some 90 papers presented at the 86th annual meeting of the American Public Health Association and related organizations held in St. Louis, Mo., on October 27-31, 1958.

Summaries were selected for publication in the following pages to present in one volume a representative body of facts and ideas dis-

cussed at the conference. Omitted from these selections were papers scheduled for early publication in the *American Journal of Public Health*, papers whose authors provided no copies for the press, and certain others which for one reason or another were not suited to summarization.

A few papers omitted from this selection are under consideration for publication in full in subsequent issues of *Public Health Reports*.

Edge of the Future . . .

Prefers "Dispersal" To Urban "Sprawl"

In considering some of the effects of urban expansion on housing and community growth, Dr. Coleman Woodbury, director of urban research at the University of Wisconsin, pointed out that urban sprawl is a loaded term. Who, he asked, could possibly find any merit in a phenomenon labeled "sprawl," a term redolent of clumsiness, immaturity, and ridiculousness?

Whatever the conceptual differences between sprawl and dispersal, the characteristics of current urban growth in all parts of America are the same, and involve, he observed, the more or less planless extension of urban building on and on into the countryside with little or no attention to community facilities and services, topography, future transit and transport problems, and so on.

Characteristics

Woodbury cited estimates of the U.S. Bureau of the Census which reveal that 95 percent of the population increase in the United States

from 1950 to 1956 occurred in the 168 standard metropolitan areas and urban areas in their vicinities; the metropolitan areas, excluding urban areas in their vicinities, accounted for 85 percent of the population growth. Furthermore, he said, if we accept the fact that a large proportion of nonurban metropolitan areas are urban in employment, orientation, and ways of life, then national population growth is almost entirely urban.

Woodbury broke metropolitan areas into three subareas: central cities, suburbs, and rural-urban fringes. Increases in population during 1950-56 for these three subareas were 15.6, 27.2, and 41.5 percent, respectively. In other words, he said, over a recent 6-year period, more than two-thirds (68.7 percent) of the national increase went into population areas outside their central cities, and more than two-fifths into metropolitan areas outside of both central cities and suburbs.

Nearly all of the rural-urban fringes and many of the suburbs, Woodbury averred, are poorly prepared in governmental structure and finances, customs and traditions,

civic organization, and even in prevailing attitudes to take care of this flood of in-migrants and their needs.

Another characteristic of urban dispersal, Woodbury observed, is the concentration in central cities of poor newcomers unskilled in urban vocations and living. More and more suburbs, he said, are now in the middle and lower middle income ranges, and the old image of the suburbs as predominantly bedroom towns of the wealthy and well-to-do is no longer valid.

Problems

Woodbury identified seven problems that urban growth and dispersal are forcing on the attention of those concerned with the future of housing and local community development.

- The concentration of low income in-migrants in central cities and the relative decrease and slower growth of some economic activities there result in a relative reduction in per capita tax-paying capacity in central cities. At the same time, there is a greater need for more services and expenditures for health protection, housing, recreation, police, welfare services, and schools in central cities.

- In many large and growing

Beginning with the LD₅₀ test on rats for toxicity of ingested chemicals, the toxicological laboratory of the company screens all products for hazards. To measure irritability to the skin and eyes, a single large dose is applied to the skin of a rabbit and kept in contact for 24 hours, and a small amount is dropped in a rabbit's eye. Liquid products are vaporized, and test animals are exposed to controlled concentrations until systemic toxicity appears. As indicators of effects of

chronic exposure, rats experience the vapors for periods up to 8 hours. The laboratory also conducts a routine test of subacute toxicity by adding controlled amounts of the product to the food of animals for 30 days.

If the product is a solid there is likely to be little or no vapor. Skin and eye data indicate the possibility of toxicity on contact. If handling of a product creates dust, workmen can be protected from inhaling toxic amounts by safety gear.

under the committee on mental health, and sufficient funds were allocated for its operations.

In 1955, the committee on mental health was raised to the status of council, and the subcommittee on alcoholism was raised to the status of a full committee.

Results Enumerated

What have been the committee's accomplishments? Block summarized a number of them:

- Two well-received exhibits were built. They are available for AMA conventions and for meetings of all State and county medical societies that request them.

- Interest in alcoholism has been stimulated in the State medical societies. Whereas few State medical societies had committees working on the problem before the committee on alcoholism was formed, 37 States now have such committees.

- In 1956, four articles, written by members of the committee, appeared in the *Journal of the American Medical Association* on the medical, psychiatric, physiological, and sociological aspects of alcoholism. In 1957 the articles were bound with additional information and issued as a manual for the use of general practitioners.

- At the request of the committee, the AMA purchased a complete set of the Abstract Archives of the Alcohol Literature, which has enabled the committee to answer a flood of queries on the subject.

- In 1956, the AMA House of Delegates passed a resolution, submitted by the committee on alcoholism, urging all general hospitals throughout the country to admit alcoholic patients to their general medical floors. This represented a tremendous victory, Block said, for it meant that "the largest medical organization in the world had now recognized alcoholism as a disease which warrants admission to general hospitals for those people suffering from it."

- In 1957, the committee produced a directory of rehabilitation resources, listed by States, and

Mental Health and Alcoholism . . .

AMA Action on Alcoholism Reported by Dr. Block

The family physician is in a unique position to find cases of alcoholism and to prevent its more serious sequelae, but he must first be informed of his responsibilities, observed Dr. Marvin A. Block, chairman of the committee on alcoholism of the American Medical Association.

Block recounted the history of the AMA's efforts in calling the attention of the Nation's physicians to the health problems of alcoholism, transferring the disease thereby from a social to a medical priority.

He recalled the early efforts of an eminent physician in Erie County, N.Y., who, in 1948, having observed the successes of Alcoholics Anonymous, placed the problem of alcoholism within the province of medicine. A medical committee was formed under his instigation to stimulate the interest of physicians, and he helped create a citizens committee whose purpose was to educate the public about alcoholism as a medical disease, and the possibilities of treatment and rehabilitation. Block said.

Summit Action

In 1950, this physician, seeking concerted national action by his fellow physicians, brought his ideas be-

fore the AMA House of Delegates, which passed a resolution establishing a committee on alcoholism within the commission on chronic illness. The following year, Block said, a committee on the problems of alcoholism was appointed as a subcommittee of the chronic disease committee, but no appropriations were passed, with the result that the subcommittee never met.

In 1952, a year after the subcommittee had been appointed, its members were informed that the subcommittee had been disbanded. The subcommittee, Block said, promptly asked for the appointment of a new committee and an appropriation of funds.

Sequel Recounted

During this time, Block said, the lay committee on education on alcoholism was functioning very well; it had become affiliated with the National Committee on Alcoholism, and, as a result of its actions, a rehabilitation center for alcoholics was established by the University of Buffalo Medical School.

In 1953, the executive secretary of the AMA committee on mental health was invited to visit the medical school's facilities and to discuss the possibility of forming a subcommittee on alcoholism. The upshot was the creation of a subcommittee

cupational health by Colonel George M. Knauf, surgeon at the Air Force Missile Test Center, Patrick Air Force Base, Fla.

So far, he said, all evidence suggests that any detrimental effects are thermal and occur only at certain intensities and frequencies. Power produced by present equipment does not attain the maximum safe exposure level of 0.01 w./cm.² beyond 500 feet from the point of origin. It therefore poses no threat to residents in the vicinity of radar sites. And common sense precautions preclude injurious exposure in operating and maintenance personnel, Knauf said.

Research, Knauf reported, has revealed the following facts about the effects of microwave energy:

1. Few biological injuries have been observed from exposure to this energy above 3,000 megacycles.

2. The crystalline lens of the eye is the tissue most sensitive to microwave energy; exposure can result in opacities of the lens. But such opacities have not been observed with exposure to power levels below 0.12 w./cm.² regardless of the length of exposure.

3. Some evidence of an accumulative effect has been found.

4. Some evidence exists of an electrical effect on nerve impulse propagation by exposure to extremely high frequency energy. (This may be of value in diagnosis and treatment of selected neuromuscular diseases.)

5. Certain tissues, such as red bone marrow, are heated by microwave energy. (This, too, may be of therapeutic interest.)

The principal concern of industrial medicine with regard to rocket fuels, Knauf pointed out, is the fact that chemicals formerly used in reagent-bottle quantities are now being used in tank-car quantities. Moreover, he said, ordinary drivers of refueling trucks are handling enormous quantities of extremely potent chemicals, whereas trained laboratory personnel, oriented to the hazards of these chemicals, formerly handled them.

Aeromedics Paving Way For Safe Space Flight

Television in a spaceship might be the answer to the debilitating effects of monotony on the pilot, observed Major Stanley C. White, flight surgeon, and Captain Charles L. Wilson, aeromedical examiner and research physician, in their discussion of the physiological problems of space flight before the American College of Preventive Medicine session.

White and Wilson are in the Aero Medical Laboratory at the Wright-Patterson Air Force Base in Ohio.

Overcoming monotony is just one problem facing the physician, whose main concern, along with the engineer's, is getting the pilot safely back home, White and Wilson said.

Other conditions posing questions for the medical profession are:

- Thermal dangers when spaceships leave and re-enter the earth's atmosphere.

- The necessity of reconditioning exhaled gases within the sealed cabin of the space vehicle.

- Gaseous swelling of tissues unless adequate pressure is applied to the pilot's body in the cabin.

- Sudden decompression in the cabin's artificial atmosphere which would explode the pilot's body into the vacuum.

- Oxygen toxicity or hypoxia if the oxygen supply is too much or too little.

- Stress of rapid accelerations, reaching 8 g and maintained for 200-250 seconds. This accelerative force is equivalent to putting a 50-pound weight on the chest and 100-pound weights on the extremities, leaving only the fingers free to move.

- Psychological and physiological hazards associated with weightlessness, which occur when the earth's gravitational pull no longer prevails.

- Radiation belts around the earth which must be penetrated without danger to the pilot if the mission is to succeed.

Some of these problems have already been solved, White and Wil-

son said. A pressurized suit worn by the pilot avoids the hazards of decompression and inadequate pressure. These suits have an emergency system that automatically responds to the loss of atmosphere in the cabin and inflates the suit in a split second.

Stresses of rapid acceleration are overcome by breathing with the stomach, lying in a position with head and feet slightly elevated, and controlling instruments through digital manipulation alone, they said.

White and Wilson also said that chemicals such as lithium hydroxide recondition exhaled gases by combining with both carbon dioxide and water vapor.

Solutions to the hazards of radiation in space and of weightlessness are still being sought, they concluded.

Synthetic Resins Aid Health Techniques

Advances in techniques of health services by use of synthetic resins, described by L. J. Francisco of the American Cyanamid Company, include disposable syringes, tubing for catheters, and microscope slides and covers.

In heart and vascular surgery synthetics replace parts of veins, arteries, and valves and have been more successful than tissues grafted from another person.

At the Jewish Hospital of Denver, Francisco said, polyethylene foam is used to fill the chest cavity of a patient whose lung has been collapsed.

In food-processing plants, commonly built of unfinished concrete blocks, resin is sprayed inside the building to check the growth of bacteria. In fluid form, it penetrates, fills, and smooths the rough and porous surface.

Chemicals that are characteristically inert are more suitable for packaging and at the same time least likely to be toxic, Francisco stated.

said, are records of mental hospitals that admit and treat alcoholics. These records, he commented, contain data on the social, economic, and psychological background of problem drinkers.

Equally useful, he said, are the records on unemployment-disability compensation. What brings individuals to claim disability, the types of illnesses or injuries for which such disability is claimed, the repetitiveness and the length of such claimed disabilities are all useful clues in the search for the manner in which alcoholism takes its social, clinical, and economic toll. In 1953, Lipscomb said, California found that disabilities associated with the use of alcoholic beverages were the recorded cause of 1 percent of all claims paid, and that, for men, these claims almost equaled the number paid for malignant neoplasms. Alcoholism represented well over two-thirds of the total alcohol-associated disability claims paid.

Each State, Lipscomb observed, has an industrial accident commission with a large data-collection machinery, which includes judgments on individuals injured on or off the job. These judgments frequently follow medical consultation and advice and are, therefore, another rewarding source.

Lipscomb also referred to the advantages that would accrue from a thorough study of mortality and morbidity data, not merely for the unique populations of mental hospitals, skid rows, and prison farms, but for the population as a whole, to determine the influence of alcohol on survival and illness. He also considered the rosters of social welfare agencies as a rich source of information on the effects of intemperate drinking.

Epidemiology

In California, Lipscomb said, the focus of the State health department has been on the accumulation of as many measurable clinical and behavioral resource units related to drinking practices as possible. From this accumulation it has attempted

to obtain a composite description of the group characteristics of drinkers.

Not all persons falling into these units (for example, divorce, penal records, and drunk arrests) are problem drinkers, he said, and it is not enough for the epidemiologist simply to gather descriptive data. In the epidemiology of alcoholism, Lipscomb said, it is vital to order and use these measurements as chronological markers in the development of problem drinking, to validate current etiological studies, and to predict those groups at increased risk of developing alcoholism.

Puts Control of Alcoholics Up to Health Agencies

It is the ultimate objective of the State department of public health to make treatment of alcoholic patients a part of general medical practice within each community, and the control and prevention of alcoholism a part of community health services.

Dr. John R. Philp, chief of the division of alcoholic rehabilitation, California State Department of Public Health, made this point in an historical discussion of California's activities in alcoholism.

According to Philp, California's concern with alcoholism dates back to 1870 when the board of public health was first established. The board at that time was instructed to examine the effect of intoxicating beverages upon the citizens of the State.

In 1937, California provided for the hospitalization in mental hospitals of dipsomaniacs, inebriates, and addicts to stimulants. It was quickly demonstrated that, at most, those committed represented a tiny portion of the alcoholics needing treatment, although alcoholics entering mental hospitals soon comprised one-fifth of all admissions, Philp said.

Following a study of drunkenness in San Francisco in 1948, the first treatment clinic for alcoholism in California was established: the San

Francisco Adult Guidance Center in the health department of the city and county. Another clinic was established the following year in the Alameda County Rehabilitation Farm at Santa Rita, Philp commented.

In 1949, Philp recounted, the Governor's Conference on Mental Health devoted a section to alcoholism and recommended the designation of an agency to carry out the responsibilities of the State in this regard.

Thus, in 1954, after further study, the California State Alcoholic Commission was established by the legislature to deal with all phases of the treatment and rehabilitation of alcoholics. With a budget reaching \$700,000 annually, the program included research, treatment, rehabilitation, and public information and education. Six pilot clinics for the rehabilitation of alcoholics were created during the commission's life, in addition to a program in two private nonprofit hospitals to demonstrate the advisability and feasibility of hospitalizing the acute alcoholic as a part of the hospital's general medical service. Pamphlets, documents, and newsletters were published by the commission, and its grants supported research and the San Francisco Adult Guidance Center, Philp said.

In 1957, the commission was abolished by the legislature, and its program, budget, and civil service staff were transferred to the State department of public health. The department was charged with the responsibility of engaging in the treatment and rehabilitation of alcoholics and in the reduction and prevention of alcoholism. A division of alcoholic rehabilitation was created within the department to undertake these duties.

Since 1957, Philp said, the new division has been administering, with minor modifications and adjustments, the program inherited from the commission. At the same time, he pointed out, it has been developing a long-range plan for consideration by the legislature.

available from the AMA national headquarters.

- Two surveys were initiated in 1958, one on teaching about alcoholism in medical schools and the other on the laws relating to alcoholism in the States. Eventually, the committee hopes to formulate a uniform law applying to the handling and disposition of alcoholics, Block said.

- The committee hopes to induce Blue Cross to pay hospital benefits for alcoholics.

- Other activities have been promoted in the last 4 years to educate the medical profession on alcoholism. This has included conferences and institutes. Each institute consists of five speakers, members of the committee on alcoholism, who deliver lectures on the medical, psychiatric, physiological, and sociological aspects of alcoholism. It is a half-day's program which is presented only on the invitation of a State medical society. All expenses for these institutes are borne by the American Medical Association.

Block concluded by pointing out that the individual physician can no longer avoid the issue of alcoholism as a medical responsibility. He must treat patients who have become problem drinkers, and he must, here as in other diseases, seek to prevent alcoholism, for the answer to this problem, Block said, lies in prevention rather than therapy.

Preventive Medicine Helps Mental Cases

Reorganization of Ohio's mental health program to accent public health and preventive medical services was described by Dr. John D. Porterfield, Deputy Surgeon General of the Public Health Service.

The first step in the reorganization, Porterfield said, was to establish a public health unit within the office of the director. The unit was then staffed with a sanitarian, a nutritionist, and a physician who was trained in chest diseases, particularly tuberculosis.

The physician was named health officer of the department and given two major functions: first, to serve as consultant specialist in preventive medicine to all institutions, and second, to give particular attention to the extensive problem of tuberculosis in the mental institutions, Porterfield said.

The nutritionist, he said, had a full-time job of seeing that the inmates were fed properly within stringent budget limitations, that the food was aesthetically wholesome, and that the food would give the most mileage to the penny, reducing at the same time the garbage disposal problems.

To effect economies in the organization and procedures of the statewide food service operation, the nutritionist established a central kitchen in which recipes and menus were pretested for their adaptability in 100-portion lots, Porterfield said. This step permitted purchasing in bulk many items previously bought by each institution in small quantities, with concomitant savings. The central kitchen, Porterfield observed, also served as an excellent training facility for food-service personnel.

By devices such as this, he said, the nutritionist earned her annual salary almost monthly in both food savings and food-service improvements.

The problems of the sanitarian ramified from the agricultural occupations of the inmates. A long-range program was begun to improve abattoirs and meat-processing facilities, milk production and processing, and canning of food crops so that they would prove "an asset rather than a threat to the patient," Porterfield commented. The sanitarian also had the monumental task of attempting to provide adequate washing and toilet facilities for the huge population residing in antiquated buildings.

Developing screening mechanisms to uncover early signs of chronic degenerative disease in the inmates was considered by Porterfield to be a rare opportunity. Not only did

it mean improving their physical health and prognosis, he said, but it also meant improving their psychiatric prognosis.

Asks More Illumination On Intoxication

Twice as many drinkers as non-drinkers were involved in fatal automobile accidents in California, an analysis of traffic accidents in 1955 revealed. Investigations of a finding such as this, declared Dr. Wendell R. Lipscomb, division of alcoholic rehabilitation, California State Department of Public Health, are sorely needed.

The discouraging thing about the personal consumption of alcoholic beverages in this country, he said, is how little is known about it. Citing the need to know the who, how, when, and where about the use of distilled beverages, Lipscomb suggested several sources of epidemiological data. The purpose of collecting the data, he pointed out, is to help identify the problem drinker so that the basis for sound interventional and preventive measures may be established.

No single average drawn for the country as a whole can meaningfully dictate the proportion of drinkers in any particular city, he observed, adding that to obtain the proper information, one must study the distribution of alcoholic beverages and then investigate each community. The pattern of drinking may then be related to data on mortality and morbidity.

Sources for Data

However difficult it may be to compare one area with another because records and definitions of alcoholism vary from place to place, within any given community there is a surprising consensus as to what constitutes an arrest for drunkenness, or a crime or traffic accident that is related to the use of alcohol, Lipscomb averred.

Other sources of data, Lipscomb

discharge from a hospital must precede nursing home care, Brewster added, nursing home cases have amounted to about one-fifth of 1 percent of all cases and one-half of 1 percent of all days of care. The average stay in the nursing home has been about 30 days, and the cost per day about the allowed amount of \$8.

Prepaid Prescription Plan Organized in Ontario

A voluntary prepayment plan for prescription medicine has been organized in Canada by W. A. Wilkinson, a pharmacist and president of Prescription Services, Inc., a private, nonprofit body in Windsor, Ontario.

Started in January 1958, with March 1 the first effective date, the plan has grown from 65 subscriber families for the first month to 244 for the fifth. Although financial success is not yet assured, Wilkinson cited two trends which he believes indicate that such a plan is feasible:

- A plateau for prescription price seems to have been reached.

- A plateau of use seems to be in the offing.

Average prescription price times use rate will establish a premium, and if this premium can be kept within reason, we can produce a popular policy, he declared.

The average prescription price, Wilkinson said, seems to have leveled off at about \$3.50 per month. The monthly use rate has dropped from 0.655 to 0.386, and he expected it to level off at about 0.250.

Now serving Essex County in Ontario, the plan, if successful, will be extended to the rest of the Province, according to Wilkinson. Seventy-five pharmacies, 64 in the Windsor area, are currently members. As a condition for membership a pharmacy must lend the corporation \$150, repayable in 10 years without interest. Subscriber membership is available only through groups, with 75 percent of a group participating.

A major problem, Wilkinson admitted, has been selling the service to eligible groups. The invalid have clamored to join, because pre-existing conditions are not excluded, but many well people, never having spent much for medicine, have felt they would not benefit. Employees have tended to look to their union to obtain the service for them, and management has frankly opposed giving another "fringe benefit," he pointed out.

On the brighter side, Wilkinson reported little evidence of cheating by patients. Abuses can be spotted, he said, by examining the pharmacists' charge cards, and a warning that the service will be canceled helps to stop them.

The service covers only drugs prescribed by physicians and dispensed by a member pharmacy. For various reasons, medicine dispensed or administered by physicians, medicine prescribed by dentists, insulin and diabetic supplies, vitamins (except those designated "therapeutic vitamins"), and parenterally administered drugs are not covered, Wilkinson stated.

Psychiatric Care Included In Labor Health Plan

A psychiatric program has been operating successfully since 1946 in the St. Louis Labor Health Institute, a group practice prepaid medical care plan serving some 15,000 union members and their families, according to Dr. Louis L. Tureen, one of three psychiatrists working part time for the institute.

As a member of the plan's medical team, the psychiatrist acts both as a consultant to the medical staff and as therapist to individual patients, Tureen reported. About half the patients referred to the psychiatric service for diagnostic appraisal, he pointed out, are returned to the referring physician for continued medical care.

Treatment, geared to the medical needs of the patients, but necessarily

limited by the economic framework of the organization, includes supportive therapy, suppressive therapy, and dynamic psychotherapy, the psychiatrist said. The first two types are predominant, primarily because of the limited psychiatric time available (20 hours a week), he indicated.

Tureen explained that supportive therapy, frequently accomplished in 1 or 2 interviews, emphasizes relief of distress and anxieties. He described the aim of suppressive therapy as "amelioration of symptoms," rather than resolution of conflicts. Sedatives, inhalation of carbon dioxide, and even electroconvulsive treatment are used in addition to interviews.

Interview periods average 25 to 30 minutes. However, Tureen emphasized, to make the most effective use of the time available, a "chronic supportive case" may be given only 10 to 20 minutes while a patient with a good many personality assets is allotted 40 or 45 minutes.

Only a few patients are hospitalized, he reported, although the plan allows up to 30 days' hospitalization for psychiatric patients.

From an analysis of the case histories of 471 patients selected at random during an 8-year period, Tureen concluded that "3 to 10 visits is the most fruitful and economically feasible program" for the St. Louis Labor Health Institute. Of the patients making 1 or 2 visits (40 percent), only about 20 percent showed improvement, whereas for those making 3 or more visits, the proportion was 75 percent. (Only a few made more than 10 visits.)

He also concluded that psychosomatic disorders (which affected 80 of 320 nonpsychotic patients) are best suited to the "brief superficial therapy" possible in the psychiatric facilities of LHI.

Other classifications for the nonpsychotic patients were psychoneurotic reactions (181 patients) and personality disorders (50 patients). In addition, among the 471 patients there were 90 with neurological problems, 49 classed as psychotic,

Prepayment Plans . . .

Home Nursing Care Given Subscribers in New York

A 5-year experiment in New York City indicates that provision of home nursing service, following hospitalization, as a health insurance benefit is feasible, reported Maria Phaneuf, nurse coordinator, Associated Hospital Service of New York. Her organization, New York's Blue Cross plan, conducted the study in cooperation with 4 hospitals and 5 visiting nurse associations.

In addition to promoting the well-being of the patients, the first objective of the experiment, provision of the nursing service reduced costs of illness by shortening hospital stays, Phaneuf stated.

For the first 500 patients receiving the service, hospital stays were shortened by 7,948 days, according to the physicians' estimates, even though the average stay was 27 days. This reduction, she emphasized, meant an estimated saving of \$152,000 after payment of \$25,000 for the home nursing service. About half the saving accrued to Blue Cross and the other half to the patients.

The reduction in length of hospital stays also meant the release of hospital facilities. Phaneuf determined that 700 patients could have been hospitalized for average stays of 11 days in beds not needed by the 500 patients. Assuming an 80 percent occupancy, 26 hospital beds were made available through use of home nursing service, she added.

About three-fourths of the 500 patients were under private medical supervision, and about the same proportion were 45 years old or older. Nearly two-thirds suffered from one or more long-term illnesses.

The home nursing service was an elective alternative to further in-hospital care, Phaneuf explained. Moreover, use of home service in no way altered the amount of inhos-

pital service available to each subscriber in his contract with Blue Cross.

Discussing organization of the program, Phaneuf called it "an experiment in cooperation between voluntary hospitals, visiting nurse agencies, and Blue Cross for better service to the patients and the community." Written agreements between the participating organizations outlined responsibilities.

The visiting nurse agencies were paid by the hospitals at the agencies' community rates, and Blue Cross reimbursed the hospitals.

Now authorized by New York State law to provide care only in or through hospitals, Blue Cross has requested an amendment to permit payment for home care, including nursing service, appliances, drugs, medicines, supplies, and ambulance service, Phaneuf concluded.

Syracuse's Approach

In Syracuse, N.Y., the Visiting Nurse Association is focusing its attention on major medical insurance, which some of its patients now carry, announced Mabel F. Chrystie, executive director of the association.

Patients of the VNA with major medical insurance numbered 14 in 1957 and 28 during the first half of 1958, Chrystie said.

At present, the Syracuse VNA is participating in a local unit set up "to develop mutual understanding between the insurance companies, the industries insured, and those who provide the services covered." In addition, the following steps have been taken, the nurse reported:

1. Space added to the family service record for recording information about major medical insurance.

2. A card file set up for information about each plant or company insured (including a copy of each insurance manual) and about the local offices of the insurance carriers.

3. A card file developed for recording experience of individual patients.

4. A special billing form devised for use by patients in obtaining insurance reimbursements.

Considering the phenomenal growth of prepayment plans to date, the enormous potential for group coverage in Syracuse, and the increasing emphasis on home care, we expect major medical insurance to be a source of income for the VNA, Chrystie declared.

Six Hospitalization Plans Cover Nursing Home Care

At least six Blue Cross plans are providing coverage for nursing home care, stated Agnes W. Brewster, medical economist with the Social Security Administration.

Describing briefly the nursing home benefits offered, she noted that each plan has at least one of the following limitations:

1. Contracts are offered only to groups, which excludes most retired and elderly persons.

2. Beneficiaries must be discharged from a hospital directly to a nursing home, a provision which tends to confine cases to certain diagnoses.

3. A limit on benefit days during a lifetime.

4. A co-insurance provision, with the patient paying 20 percent of the nursing home charges.

Brewster indicated also that no completely satisfactory scheme has been worked out for determining what are acceptable institutions for the beneficiaries.

Concluding with statistics on use of nursing homes, she reported that under the Philadelphia Plan, which limits benefits to 30 days in a lifetime, the number of nursing home cases has amounted to only one-half of 1 percent of all cases since 1951. The cost per day of nursing home care was a little more than half the cost of a day of hospital care, she said.

Under the Delaware Plan, where

interested union were given complete dental examinations, including full-mouth X-rays, prophylaxis, and clinical examination.

Assuming inclusion of service for all accumulated dental needs in the first year's contract and 100 percent utilization, it is estimated on the basis of the surveys that the first year's premium would vary from \$60 for a plan limited to examination, prophylaxis, X-rays, fillings, and extractions to \$300 for comprehensive coverage, Beebe said. However, he added, the survey of treatment needs suggests a utilization rate nearer 50 percent, which would halve the per capita premium.

So far, the scope of a specific dental care plan has not been discussed with any consumer group. Nor has a final fee schedule been presented to participating dentists or a prospective group purchaser.

Any plan the corporation sponsors will be an open panel plan, with all interested dentists participating, Beebe said.

Full Dental Cost Insurance Awaits Public Demand

Insurance for comprehensive dental care on a broad scale awaits public demand, stated J. F. Follmann, Jr., director of information and research, Health Insurance Association of America, New York City. Interest now is localized mainly among labor unions, some employers, public health officials, and dental societies.

Dental costs in 1953, he said, were from \$45 to \$95 for 10 percent of the families in the Nation, from \$95 to \$195 for 6 percent, and more than \$195 for 4 percent.

Reviewing current types of insurance coverage for dental expense, he pointed out the trend toward covering only work resulting from accidental injury or that performed in hospitals. Expansion of in-hospital coverage is inhibited by the lack of concise contractual definitions, the hazard of unnecessary use of hos-

pital facilities, and, in the absence of sound statistics, the expense of numerous contract revisions. Follmann reported that the Health Insurance Association of America, with the American Dental Association, has been developing a statistical base for estimating costs.

He suggested that a workable plan would protect against costly dental care in or out of the hospital, within the frame of comprehensive medical cost insurance, leaving the less expensive and the luxury items to be borne by the individual. For workers in industry, he proposed examination and referral combined with postpayment for routine costs and insurance for serious and unpredictable expenses.

Outlines the Objectives Of Dental Care Plans

Only 31 percent of the American people who need dental work are getting it, mainly because of cost, in the opinion of Jerry Voorhis, executive secretary of the Group Health Federation of America, Chicago. The solution lies in the group dental health plan, he believes, because of reduced costs resulting from lower overhead, better use of equipment, and fewer expensive operations brought on by neglect.

In illustration, he mentioned the dental care plan of a longshoremen's union, used by 95 percent of the eligible children of members, and a group practice clinic in West Virginia which gives all kinds of dental care to miners who pay \$1 a month. Losses are subsidized by a miners' association. Both dental restorative work and maintenance are supplied in the medical plan of a St. Louis teamsters union, supported by a health and welfare fund to which employers contribute 5 percent of the payroll.

There is still no "magic formula" for restorative work, he commented, describing as practical the plan of Group Health of Washington, D.C., which, on completion of restorative

work, maintains oral health on a prepaid basis.

He pointed out that maintenance costs are predictable, about \$40 to \$50 per year as estimated by a Public Health Service publication in 1954.

Voorhis defined the aim of group dental plans as high quality dental care, including treatment before serious decay, as well as ample compensation for the dentist. Such care is not always possible in solo practice, fee-for-service dentistry, he said, where specialization is difficult, time and equipment are often wasted, and the dentist is sometimes preoccupied with economic problems.

Health Agency Action

The health agency has a heavy responsibility, not just a "role," in the development of group dental care ventures, asserted Dr. Arthur Bushel, director of the bureau of dentistry, New York City Department of Health. He pointed out that the activity is justified as a contribution toward fulfilling unmet dental health needs of the community.

Toward encouraging such enterprises, the agency provides neutral ground for all groups concerned, said Bushel, remarking that many unilateral plans do not "get off the ground" because they are soon opposed by some local group.

The agency can contribute by supplying health statistics for estimates on costs and utilization and on dental manpower. It can also train survey personnel, interpret survey data, and give administrative leadership. Most important, concluded Bushel, the agency's dental health education effort can be directed at the community's potential subscribers.

Health Insurance Plan Offers Social Service

Social work consultation has been added to the services of the Health Insurance Plan of Greater New York, according to Edith S. Alt, di-

and 6 found free of neuropsychiatric disorders.

For the immediate future, Tureen sees an urgent need for the addition of a social worker to the psychiatric service, as well as increased psychiatric staff. He also recommended adding to the regular staff a psychologist who was employed periodically on a fee basis.

Dual Choice Programs Developed in California

A choice between the traditional fee-for-service type of health insurance and a group practice prepayment plan is offered beneficiaries of health and welfare funds by 53 industrial and occupational groups in the San Francisco Bay area, according to Avram Yedidia, consultant to the Kaiser Foundation Health Plan, Oakland, Calif.

Development of such dual choice programs, Yedidia declared, has permitted the Kaiser plan, a group practice plan, to provide medical care to employees covered by health and welfare funds without departing from its principle of voluntary enrollment. The fee-for-service plans in dual choice programs are provided by commercial insurance companies, Blue Cross, or Blue Shield (Blue Cross and Blue Shield are competing organizations in California).

Originally set up for employees of the Kaiser companies, the Kaiser Foundation Health Plan was opened to other groups and individuals at the end of World War II, with voluntary enrollment as a basic concept.

Analysis of Kaiser plan hospital utilization rates for 1957 for dual choice groups indicates that the rates are directly related to age, as are the rates for the total membership of the plan, Yedidia said. He concluded that "the mechanism of dual choice does not appear to result in favorable risks selecting one plan and unfavorable risks selecting the other."

Yedidia noted, however, that special circumstances in a group may produce substantially different types of enrollment in the two types of plans. He pointed out also that when dual choice is introduced to a group which already has a prepayment plan, the existing plan has the decided advantage, at least as far as numbers are concerned. Furthermore, few individuals shift from one plan to the other, although the opportunity once each year to change is a feature of the dual choice programs.

Migrant Worker Contracts Include Health Insurance

Nonoccupational health insurance is provided for certain agricultural migrant workers in this country, at the workers' expense. Helen L. Johnston of the Public Health Service described this development in health insurance, which she said is unique in three respects: the character of the groups insured, the auspices under which the insurance is arranged, and the arrangements themselves.

Three groups of migrants are receiving the benefit: Puerto Ricans who come to the mainland under an organized program, British West Indians, and Mexicans. All are single males carefully screened for physical defects and employed under work agreements or contracts, Johnston stated.

For each group, a governmental organization has some responsibility for insurance arrangements. The organization may play an active part in planning the program in addition to selecting the insurance carrier (Puerto Ricans and British West Indians), actually administer the program (British West Indians), or prepare a list of approved insurance companies (Mexicans).

Arrangements for premium collection are essentially the same for each group of workers, according to Johnston. Premium payments

are deducted from the worker's wage by the employer, who sends a single check for all his employees directly to the insurance carrier or to the responsible government agency. The insurance covers only the period of employment. Claims are sent to the same agency as the premiums.

The program for the Mexicans, conducted under an international agreement between Mexico and the United States, differs in one important respect from the other two, Johnston pointed out. For this group, each employer arranges for the insurance with a company selected from among those on a list prepared by the U.S. Department of Labor. For the other two, the insurance carrier is selected by the government agency on the basis of bids submitted each year.

District Dentists Devise Group Service Plan

The District of Columbia Dental Society has established a nonprofit corporation to administer group dental care plans, announced Dr. Steven O. Beebe, chairman of the economics committee of the society.

The corporation is expected to be in operation soon. At present, the District of Columbia, Maryland, and Virginia Boards of Dental Examiners are investigating, at the request of the dental society, the corporation's legality with respect to the dental practice acts.

Steps completed include development of a tentative fee schedule and an estimate of dental needs in a representative group, Beebe reported. These can serve as a basis for estimating service costs, although final determination of the premium must await accumulation of actual experience.

The tentative schedule of fees is based on findings of a survey among dental society members to ascertain their charges for basic treatments. For the estimate of dental needs, one-fifth of the members of an in-

Frequency of medical visits for preventive health services was high among children and prospective mothers, but it tapered off almost to nothing for adults, especially the older ones, the authors reported.

Changes Seen

The authors suggested that the numerous social groups in the county could be put to use in increasing health consciousness and in deciding how to carry out the many nursing and home sanitation activities that are clearly needed in the county.

They concluded that meeting the needs of differing counties may entail changes in the role of public health personnel in the community, new ways of financing health services, and new combinations of skills, and, above all, it may entail "giving up our dedication to established notions of exactly how health services should be delivered."

Finds Method to Slim Experts' Waste Line

A new method for evaluating and making more effective use of the time and talents of professional public health personnel was described by Harvey L. Shapiro, assistant to the executive vice president, Albert Einstein Medical Center, Philadelphia.

Pointing to an already critical shortage of well-trained and well-qualified personnel, Shapiro said that professionals presently employed in nonclinical positions may be wasting more than 50 percent of their time in nonprofessional activities.

A professional activity, he explained, is not an activity which a professional performs or is asked to perform; it is an activity that requires professional training and experience, and simply cannot be performed by one with lesser, or other, training and experience.

Shapiro suggested how health program directors can develop with

their staffs a workload study form which would permit them to analyze the kind of jobs they do and time spent on them. Representative periods on the job should then be selected for study, with, perhaps, a 1-day pretest of the form.

After sufficient data have been collected, Shapiro observed, the percentage of the time spent on each class of activities is easily calculated as a proportion of the total elapsed time for the selected period; spot checks should be used to verify calculations. Following an analysis of the results in terms of specific program objectives, a rescheduling of functions emphasis based on program need should be undertaken, he said.

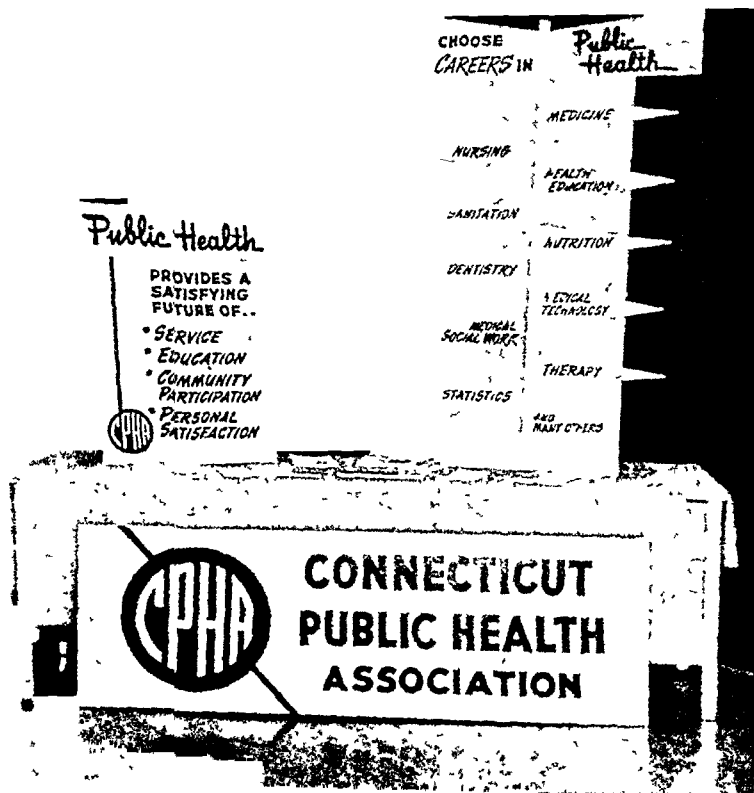
In the example of his method, Shapiro showed that a medical social consultant spent 45 percent of

her time on nonprofessional activities such as typing, filing, arranging for transportation, and preparing weekly statistical reports, all of which, he said, could have been done by a skilled nonprofessional.

Released from tasks of this nature, Shapiro said, the medical social consultant could have spent more time in the activities for which she was trained, or she could have taken on additional duties for which she, by training and experience, was fitted.

Promotes Student Interest In Health Careers

To stimulate the interest of Connecticut's junior and senior high school students, the Connecticut Pub-



"Health Careers" recruitment exhibit.

rector of the community resource division, which administers the program. The program has, in addition to the director, four consultants in the field, each assigned to one borough.

The three main objectives, Alt said, are to provide direct service for IIP's subscribers, to provide consultation service on community resources and social services to physicians and other personnel in the 33 medical groups of HIP, and to participate in all types of educational activities.

Direct service activities are planned not only to help with social and psychological needs of individu-

als referred by the medical groups but also to help the referring physicians learn more about the subscriber's problems. Only through the experience resulting from individual referrals, Alt declared, do we expect to modify attitudes and feelings sufficiently to affect a broader segment of the subscriber population.

In setting up the program, it was necessary to evolve practical methods through experience, for there was no blueprint to follow, Alt remarked. She believes the present program will help to demonstrate the possibilities of social work in a voluntary prepayment plan.

and, conversely, health action may sometimes be determined by motives unrelated to health.

Traditional Health Services Need Reappraising

Are current public health practices fitted to deal with current public health problems? This question was posed by four investigators from the Bureau of State Services, Public Health Service: Dr. Donald Harting, Dr. Gordon Macgregor, Dr. Barkev S. Sanders, and Dr. Irwin M. Rosenstock.

For their initial study, designed to explore the implications of their query, the investigators chose Kit Carson County in the Great Plains of Colorado: 2,160 square miles, with only 6,700 people. The aged, 65 or more years, are relatively numerous. Infants under 1 year are relatively few, as are young people, aged 15 to 35.

Survey Results

A morbidity survey revealed, the authors said, that the major health problems in the county were heart disease, asthma, hay fever, and other allergies, diseases of the genitourinary tract, arthritis, back trouble, and other troubles interfering with motor function.

But, the authors found, no local organizations were providing such services or skills as physical or occupational therapy to prevent or ameliorate some of these conditions. Instead, one frequent procedure was recourse to a chiropractor. For men 45-54 years of age, the volume of service was actually greater for chiropractors than for physicians.

The dominant social value among these people, the authors observed, was independence; they frowned upon accepting help without paying for it in money or in kind. Beyond the public sharing of the costs of public health service, the authors asked, cannot the user of a service pay his share, to avoid the appellation of charity?

Methods and Management . . .

Puppeteer Questions The Dramaturgist

Shall the person interested in stimulating people to give highest priority to health matters alter his program to appeal to people's needs or shall he try to teach people new motives for health? asked Dr. Irwin M. Rosenstock, chief, Behavioral Studies Section, Public Health Service.

Adapting programs to people, Rosenstock said, might require radical reorganization of present programs and administration in order to use strongly held economic, sexual, or parental motives. On the other hand, he said, teaching new health motives to people might conflict with other strong values they currently hold.

At the present time, Rosenstock pointed out, there is not enough knowledge of people's motives and beliefs concerning health action to provide a wholly scientific approach to improving their health behavior. Additional research will be needed to permit a more scientific approach. However, he added, much can be done currently to increase public participation in health programs by using the results of past research.

The reported conclusions grow out of a consideration of principles of human motivation which apply to health action. According to Rosenstock, they are:

1. Behavior is determined first by the degree to which a person sees a health problem as threatening, that is, having both serious consequences and a high probability of occurring in his case, and second, by the extent to which the motivated individual believes that some course of action open to him will be effective in reducing the threat.

2. Behavior emerges from conflict among motives and among courses of action. When motives conflict and compete for attention, those with the highest value for the individual will be aroused. The motive for health, at least in the person who believes himself healthy, is probably not as potent as are economic and social motives. When an individual believes that no available course of action will be effective or that a prescribed course of action will create equally or more serious difficulties of other kinds, he is the more likely to follow a false course.

3. Motives related to health may not always lead to health action,

1. Long-term studies were undertaken as the need for them was envisioned.

2. Accumulated family records in Hagerstown, where the population remained highly stable, enabled researchers to analyze the effects of changed economic conditions on growth and development; relate Selective Service findings to the physical condition of men examined when they were children; study the relationship of chronic illness and economic status over a 20-year interval; provide long-term data on the progressive effects of illness; standardize techniques for health examinations and casefinding; and compare cardiometric examinations over a 20-year interval.

3. The decayed, missing, and filled index of dental health originated in Washington County.

4. Studies were completed on vitamin A deficiency, hearing acuity, and the effects of repeated inoculations with pneumococcus antigen.

5. Data collected in this area have been widely used for comparison with findings in other health studies, for planning health programs, and for instruction in schools of hygiene.

6. Participation in research by members of the health department's staff has increased performance, competence, understanding, and enthusiasm. Research opportunities have, in addition, attracted persons with high qualifications.

7. Research activities have enhanced the interest of the community in services to health.

Medical Students Ignore Public Health Careers

Only 5 percent of 2,669 medical students in 8 schools signified agreement with the statement, "I am considering making public health my major field of interest."

Factors influencing the recruitment of physicians to work in public health are under investigation by the committee on professional edu-

cation of the American Public Health Association. The authors of this particular study, all from the University of North Carolina School of Public Health in Chapel Hill, were Drs. Robert E. Coker, Jr., Kurt W. Back, Thomas G. Donnelly, Norman Miller, and Bernard S. Phillips.

Terming the reply "not surprising," the authors went on to examine the attitudes underlying the highly negative response. Other questions revealed, they said, that there was considerable confusion, even among those students expressing interest in public health, as to what the public health field comprises.

Although medical students who want to specialize in public health are relatively few, 21 percent of the students said they were interested in doing some work in public health as part of a different career, the authors said.

"The general picture we get from those interested in public health," the investigators reported, "is that they are less clear in their thinking than other medical students about their future as physicians. This apparently is the impression which they give to other students, who characterize them as less ambitious, less independent, and less creative, and this stereotype represents approximately the picture these students give of themselves."

Attitudes Differ

The students favorably disposed to public health differed from the others in that they were considerably less interested in independence of action, in a variety of activities, or in certainty of effect. They were also less concerned with prestige within the profession, with a manageable workload, and with challenges to their capabilities. They were less concerned with serious consequences in the event of mistakes and with having a job which would require exacting analysis, cast them in the role of counselors, or provide a high income, the authors found.

On the other hand, they said, stu-

dents favorably disposed toward public health were more likely to feel that an ideal job should permit a contribution to knowledge. Another finding was that, given a choice among independence, success, and popularity, students favorable to public health put success last; among students negative to public health, success was the first choice.

The authors added that the favorably disposed students were less likely to have been premedical students in college and were more likely to feel insecure about their standing in medical school.

Backgrounds Differ

The background of the 21 percent favorable in some way to public health was revealing, the authors stated. These students were found to have less financial backing for their future plans as physicians, and were more likely to come from professional families, other than medical, which emphasized satisfactory occupation rather than a financially rewarding career.

Furthermore, these students revealed stronger religious convictions than those negative to public health, which the authors thought was likely to play an important role in their motivations.

Describing the situation for public health as "bleak," the authors pointed to two rays of hope. First, there are some medical students who manifest some interest in public health, and this interest might be nurtured and exploited. Second, current choices among medical students are frequently not final, and, moreover, public health physicians are usually late in making their ultimate career commitments.

Emergency Planning Needs Cited

Far too little is being done by health services to prepare for disasters, according to the American Public Health Association's committee on emergency sanitation prac-

lic Health Association organized its own committee on public health careers in 1956.

The chairman of the committee, Dr. Henry Eisenberg, internist with the Connecticut State Department of Health, reported on its activities.

The committee has coordinated recruitment efforts with those of the Connecticut League for Nursing, the Connecticut Health League, and the Connecticut State Medical Society and its affiliates.

In the last 2 years, Eisenberg said, the committee has assigned speakers for scheduled talks before students, distributed literature and films to guidance counselors, started free membership for students in the Connecticut Public Health Association, participated in "cluster career days" of the junior chamber of commerce in Hartford, and displayed an exhibit at many meetings of professional health organizations and guidance counselors (see illustration).

A guidebook on public health careers has also been prepared and should be ready for distribution sometime in 1959, Eisenberg said. The guidebook, written for junior high school students, describes public health careers, academic and personal qualifications, salary range and place employed, accredited schools where training may be obtained, scholarships and loans, and further sources of information.

Health Departments

Expand Research

Among several encouraging indications of advance in research is the fact that new Public Health Service extramural research projects have jumped in number from an average of 10 a year to nearly 30 during fiscal year 1957. The number of health departments participating in these grants has increased proportionately.

Summing up the role of the Public Health Service in research was

Dr. W. F. Mayes, assistant chief, Division of General Health Services, Public Health Service.

In the Service's extramural research grant program, he noted nearly \$1 million has been allocated in the past 12 years to support research in State and local health departments and one-fourth of that sum was granted in fiscal year 1957.

As an example of its intramural research activities, the relative amount of the total operating budget of the Bureau of State Services being allocated for research has increased from 30 to 50 percent between 1952 and 1958, Mayes said.

Other actions taken recently by the Service in response to the growing interest in research are, Mayes said:

- Creation of the key position of medical director, Community Services Program, in the Office of the Director, National Institutes of Health.

- Division of the old Public Health Study Section into three study sections: Nursing Research, Sanitary Engineering and Occupational Health, and Public Health Research.

- Division of the Mental Health Study Section into two sections, one on mental health and the other on the behavioral sciences.

- Establishment of general and specific research training grants and fellowships.

- Making available sizable grants for the support of experimentation and demonstration in new community mental health programs.

- Setting up a special advisory committee on epidemiology and biometry, with training grants in these subjects available to the schools of public health.

- Setting aside a portion of the Hill-Burton Act funds for research and demonstration in the field of hospital and medical facilities.

- Setting up a position of liaison officer for research between the Bureau of State Services and the National Institutes of Health.

- Employment of research grants officers in the Bureau of State Services and Bureau of Medical Services

for the encouragement of extramural research in specific subjects, such as sanitary engineering, nursing, occupational health, air pollution, accident prevention, public health practice, and others.

Reviews Hagerstown Research Record

Research by the Washington County Health Department, Hagerstown, Md., in cooperation with the Public Health Service and the Maryland State Health Department was described by Dr. W. Ross Cameron, deputy State and county health officer for Washington County.

The county was selected for study initially in 1921 because of its relatively stable population and because it was typical of communities in the eastern United States in demographic characteristics, Cameron said. The objective at that time, he observed, was to obtain data on morbidity. The county was used also to test the validity of a number of public health methods.

Early Gains

Publications, especially those on morbidity, originating from the first study period (1921-24) have become standard references, Cameron averred. Furthermore, he asserted, many of the procedures developed during this period are in frequent use today. Patterns were established which nationwide studies have since utilized, including the investigations of the Committee on the Costs of Medical Care from 1926 to 1928, the National Health Survey in 1935 and 1936, and the current National Health Survey, he said.

Later Gains

Beginning in 1933, the studies, which had been concerned with communicable diseases, explored etiological factors for preventing chronic disease. Cameron summarized the accomplishments in research during this period as follows:

tices. Most serious, the committee reported, are the lack of operational planning and the minimal participation in planning for survival.

As an essential element in dealing with disasters, the committee observed, "Operational plans spell out who is boss and who takes the boss' place when the boss isn't there . . . what equipment and supplies are available and where they are to be found, procedures for obtaining transportation, how to communicate, what to communicate, and with whom. The history of disasters is replete with scenes of chaos due to the lack of operational plans that provide for control and direction of the forces offering help, a plan that provides for a description of the course of action to be taken in a contingency, an instrument that provides direction when [conventional] communications fail and becomes the sole guide of individuals until communications and control can be reestablished."

Important considerations and principles relative to emergency planning, the committee said, are:

1. Planning must be established as a basic responsibility and continuing function of all agencies and organizations promoting and safeguarding the health and welfare of the people.

2. Operational plans for emergency sanitation services should be developed by and built around government health agencies at all levels. The personnel of these agencies must provide the framework into which other professional and technical personnel can be integrated.

3. Professional and technical personnel with experience and training in sanitation should participate only in emergency sanitation operation, avoiding responsibilities in other emergency activities.

4. Operational plans for emergency sanitation services should be integrated into the total civil defense and disaster preparedness plan, if it is underway; otherwise, sanitation plans should be developed separately and later integrated into the master plan.

5. Emergency planning must be on a disaster area basis and not restricted to jurisdictional boundaries.

6. Emergency plans must be flexible enough to meet any contingency, regardless of kind or magnitude.

7. Emergency plans must be developed for all areas of the country. Since 1953, only seven States have been free of disasters for which aid was sought from the Office of Civil and Defense Mobilization (see table). In civil defense disasters, planned or spontaneous evacuation of people from disaster areas will impose emergency conditions upon reception areas, which must be met adequately. Areas not affected by disaster or reception conditions must plan to extend assistance and support to affected areas.

8. Training in emergency sanitation practices should be developed and made available to sanitation personnel and auxiliaries. Training should include the use of radiological monitoring equipment to determine the safety of the environment, water, milk, and food, and the use of emergency equipment such as portable water purification units. (In this connection, the committee recommends reinstituting the course given by the Public Health Service prior to July 1957, entitled, "Sanitary Engineering Practices in Civil Defense Disasters.")

9. Continuing research is needed in the development and refinement of procedures for rapid identification of biological organisms.

10. Greater use and familiarity with the molecular filter technique for isolating and identifying bacteria should be promoted among professional sanitarians.

11. All available resources and equipment should be appraised. Needed resources and equipment should be determined; and mutual aid arrangements should be established among organizations to supplement resources on short notice. Lists should be compiled for local use and for State and Federal agencies in planning. Essential emergency items should be stockpiled; many of these can and should

be obtained through OCDM on a 50 percent matching basis.

12. More attention must be paid to potentially disastrous effects of breakdowns of sanitary facilities.

13. Skilled manpower should be developed as auxiliaries to public health workers.

14. In time of disaster, the chief of emergency sanitation services should devote himself solely to the administrative and executive duties of his office, according to the disaster plan.

What Are You Measuring When You Measure?

The number of times that a health officer visits a dairy farm is not a measure of the farm's sanitation practices; neither is the absence of outbreaks of foodborne diseases necessarily an indication that restaurants are following good sanitary methods, commented Dr. V. A. Getting, professor of public health practice at the University of Michigan School of Public Health.

A number of distinctions, he said, are required in the proper evaluation of programs or procedures: distinctions between results and efforts, between objective and subjective criteria, between costs and the merits of certain expenditures, and so on.

The fundamental necessity in proper evaluation, Getting pointed out, is to define one's objectives so that one may further define the attainment of these objectives, measure the degree of progress toward attainment, and evaluate periodically the effectiveness of activities.

Getting termed the routinization of certain procedures a "trap." Routine investigations of dairy or restaurant sanitation, after several years and after educational programs have been completed, may accomplish little and that little at an unjustifiable cost, he said. "Merely because a director some 20 years ago started a certain routine procedure and it was found to be good and effective at that time does not mean

Major disaster areas aided by the Office of Civil and Defense Mobilization¹

Date of declaration	State ²	Nature of disaster	Presidential allocation (in thousands) ³	Date of declaration	State ²	Nature of disaster	Presidential allocation (in thousands) ¹
1953				1955—Con.			
May 2	Ga.	Tornado	\$175	Dec. 23	Calif.	Flood	4,950
Mar. 15	Tex.	do.	358	Dec. 24	Nev.	do.	370
Mar. 29	La.	Flood	416	Dec. 29	Oreg.	do.	1,370
June 2	Mich.	Tornado	51	1956			
June 6	Mont.	Flood	315	Feb. 25	Wash.	Flood	250
June 9	Mich.	Tornado	140	Mar. 15	Pa.	do.	50
June 11	Iowa	Flood	170	Mar. 29	N.Y.	do.	50
June 11	Mass.	Tornado	500	Apr. 5	Mich.	Tornado	135
June 19	Tex.	Flood	40	Apr. 7	Okla.	do.	65
July 2	N.H.	Forest fire	150	Apr. 9	Tenn.	do.	
Oct. 22	Fla.	Flood	384	Apr. 18	Ala.	do.	
Oct. 30	Alaska	Severe hardship.	50	Apr. 21	Idaho	Flood threat	600
Dec. 6	Miss.	Tornado	164	Apr. 24	N.C.	Severe storm	200
1954				May 17	Ohio	Windstorm	1,250
Feb. 5	Calif.	Flood, erosion	587	May 21	Pa.	Storm	100
Mar. 17	Ga.	Tornado	150	June 12	Colo.	Flood	50
June 23	Iowa	Flood	175	June 23	Mo.	Water shortage.	
July 1	Tex.	do.	878	July 20	Oreg.	Torrential rain.	126
July 14	Nev.	Earthquake	194	Aug. 9	Pa.	Storm	300
July 31	S. Dak.	Flood	40	Aug. 18	Puerto Rico.	Hurricane	3,500
Aug. 4	W. Va.	do.	62	Aug. 31	Nev.	Flash flood	30
Sept. 2	Mass.	Hurricane	2,500	Oct. 4	La.	Hurricane	260
Sept. 2	R.I.	do.	2,500	Dec. 29	Calif.	Fire	100
Sept. 13	Maine	do.	1,003	1957			
Sept. 17	Conn.	do.	500	Jan. 31	Ky.	Flood	2,000
Oct. 7	N.Y.	do.	300	Jan. 31	W. Va.	do.	200
Oct. 13	N. Mex.	Flood	50	Feb. 1	Va.	do.	300
Oct. 17	N.C.	Hurricane	1,500	Mar. 1	Oreg.	do.	300
Oct. 17	S.C.	do.	750	Mar. 6	Wash.	do.	300
Oct. 18	Md.	do.		Mar. 16	Hawaii	Tidal wave	60
Oct. 22	Pa.	do.		Apr. 29	Tex.	Hurricane, flood.	2,200
Oct. 26	Ind.	Flood	175	May 16	La.	do.	3,750
Nov. 10	Alaska	Severe hardship.	(⁴)	May 18	Okla.	Flood	2,800
1955				May 22	Mo.	Tornado, flood.	2,850
Apr. 1	Hawaii	Volcano	100	May 27	Idaho	Flood	63
May 25	Colo.	Flood	175	May 29	Ark.	do.	1,200
May 27	Kans.	Tornado	325	June 22	Ill.	do.	500
June 1	Okla.	Flood, tornado.	210	June 22	Minn.	do.	800
June 21	Nev.	Flood	200	June 22	N. Dak.	Tornado	24
Aug. 13	N.C.	Hurricane	3,950	Sept. 5	Kans.	Flood	106
Aug. 15	N. Mex.	Flood	118	1958			
Aug. 20	Pa.	Hurricane, flood.	1,000	Apr. 4	Calif.	Flood	2,000
Aug. 20	Conn.	do.	1,000	May 15	Ark.	do.	500
Aug. 20	Mass.	do.	1,000	May 20	La.	do.	
Aug. 20	N.J.	do.	1,000	June 6	Tex.	do.	
Aug. 20	R.I.	do.	1,000	June 26	Kans.	Tornado	
Aug. 20	S.C.	Hurricane	400	Total			
Aug. 22	N.Y.	Hurricane, flood.	500				63,500
Dec. 22	Alaska	Severe hardship.	25				

¹ Formerly the Federal Civil Defense Administration. Many more disasters occurred than are listed here, but records were not kept of all of them.

² No records for seven States: Arizona, Delaware, Nebraska, Utah, Vermont, Wisconsin, and Wyoming.

³ Rounded to the nearest thousand. The amounts of money allocated by the President serve as a rough comparison of the relative magnitude of the disasters.

More specifically, they indicate the relative damage to publicly owned facilities.

⁴ A portion of these funds were made available to other Federal agencies.

⁵ Alaska authorized to expend unused funds from Presidential allocation of October 30, 1953.

⁶ Presidential allocation subsequently reduced.

⁷ Presidential allocation subsequently withdrawn.

department. But in communities of fewer than 100,000 people, Magnuson said, such activities may be undertaken by the basic health department staff.

Yardsticks Offered

Magnuson suggested several yardsticks with which the health officer might measure the strengths and weaknesses in his own occupational health situation.

In appraising that situation, the health officer should determine the general health status of workers and the specific occupational health problems in his community. He should look for substances that produce dermatitis, chemical causes of toxicity, and environmental factors such as fumes, dust, and noise.

He also thought that the health officer should determine the characteristics of the community's labor force (obtaining such information from the Bureau of the Census, State employment offices, bureaus of economic research, and the local chamber of commerce), and the types of industry in which the workers are employed. The health officer can expect, for example, Magnuson said, a frequency of accidents 2½ times higher in small plants than in large ones. But, he noted, few of the large plants will have medical departments or industrial hygiene services.

When new industries enter a community, he pointed out, the health officer has the opportunity to develop excellent relationships with management and workers by making his services known. Even when a plant is in the blueprint stage, the health officer can be invaluable in pointing out needed industrial hygiene controls, Magnuson said.

Another essential, Magnuson observed, is information on the local incidence of occupational disease. As a first step, the health officer should determine the existence of any laws or regulations requiring reporting of occupational diseases by physicians.

If reporting is required, the health officer should arrange to be

notified of reports originating in his jurisdiction. In this regard, Magnuson said, the health officer can do much to encourage physicians to comply with laws pertaining to the reporting of occupational diseases, and he can encourage reporting by offering assistance in any epidemiological investigations that may be required. Complaints of workers or of persons living in the vicinity of an industry may also be a source of information, pointing to situations that require correction, he said.

Using the Staff

But how, Magnuson asked, can the local health officer undertake these responsibilities without diluting his staff's present activities?

He pointed out that nurses and sanitarians offer the greatest numerical potential for extending services to industry. The public health nurse, who has unquestionably won the respect of industry, can, on routine visits, familiarize plant nurses with community health services, follow infectious disease cases, and demonstrate the values of part-time nursing services in small plants lacking such services.

The sanitarian can extend his usual services of inspecting plant cafeterias, sanitary facilities, and general housekeeping to apply to industrial waste, cross connections, and water facilities. He can help reduce occupational dermatitis by determining that washing facilities are adequate and are used effectively. With some training, he can locate trouble spots for action by specialists, see that recommendations are complied with, and assist in surveys of environmental conditions in plants and in industrial health programs.

When the health officer encounters situations requiring specialized help, he can avail himself of his State health department services, as well as those of other local health departments, insurance carriers, voluntary agencies, professional associations, universities, and private consultants, Magnuson said.

He called attention to a kit containing detailed information on occupational health which is available from the Public Health Service's Occupational Health Program.

Magnuson concluded that the occupational health field may be one of the most effective for multiplying the resources of the health department in bringing services to people.

Aesculapius Cures Own Headache

Attempts to persuade industry of the need of industrial hygiene backfired when industry asked why the State government did not provide health services for its own employees, related Dr. Lester M. Petrie, director of the preventable diseases service, Georgia Department of Public Health.

As a result of rebuffs like these, Petrie said, the Georgia State Employees' Health Service was begun 3 years ago. Its policies were approved by the State and local medical societies and by the Georgia Association of Local Public Health Physicians.

The primary objectives of the employees' health service is to teach the State government's 24,000 employees the responsibility of each individual for his own health, the limitations of his own resources, and the community resources available to help him, Petrie said. With 20 people a day, 80 a week, and 3,000 by the end of the first year reached, Petrie called it "mass education."

Educational Means

Petrie said that the educational program uses multiphasic health screening tests, counseling in health problems, and first aid and emergency service.

The multiphasic health screening procedure consists of an approved battery of health tests offered to each employee on an annual basis; the tests are designed to aid him

that it must be continued at this time or in the future," Getting said.

The rapidly changing environment requires flexible programs of environmental health and open minds, he said. Progress in environmental health can be attained, he added, if we question accepted practices, investigate new approaches, test new ideas, and set new objectives.

Getting called upon public health workers to make use of the special competences available in schools of public health, and to use standards purposely developed by the American Public Health Association to aid evaluative studies. "The application of these standards to specific programs is evaluation. But to inventory or list activities is to survey a program without adequate measurement of the attainment of objectives," he concluded.

Voluntary Sanitation Pays Dividends

Sanitation in food-handling establishments improved by 18 percent in 12 weeks as the result of a voluntary self-inspection program in Rocky Mount, N.C. Public schools in the city improved the sanitation of their facilities by 16 percent in the first 2 years of a continuing voluntary program.

Commenting on these developments were Kelly G. Vester, senior sanitarian of the Rocky Mount Health Department, and Dr. J. W. R. Norton, State health director, North Carolina State Board of Health.

After the interest of management, food handlers, and the public had been aroused and cultivated, and the press, the local government, and civic groups had endorsed the plan of voluntary inspection, appointments were made in advance at restaurants for inspection during slack periods. This enabled the restaurant staff to observe the complete plant inspection and to rate themselves. In 60 establishments, 500 workers were allocated 1 inspection per month. The inspection program was based

on the North Carolina Restaurant Code and used a questionnaire covering 21 sanitation items.

During inspections, Vester and Norton said, equipment was disassembled and scraped with a knife, and deposits from the surfaces were spread on a napkin. Tables, sinks, pots, storerooms, and hard-to-reach places "went under the knife." The temperature of refrigerators and dish sanitizing equipment was also carefully noted.

The inspection form was read aloud and answers to the questions were determined by a majority staff vote, Vester and Norton reported. Informal roundtable discussion brought numerous sanitary shortcomings to light. Nobody was criticized, they said, and discussions were mutual aid sessions; reactions indicated that everybody intended to do something.

Public school self-inspection in Rocky Mount was launched on a similar basis at the beginning of the 1950-51 school year. Cooperation was obtained from the school superintendent, principals, teachers, students, and the PTA. Equipped with a questionnaire covering the sanitary aspects of the physical plant, toilets, showers, dressing rooms, and outside environs, the program got underway with weekly inspections, Vester and Norton related.

At the beginning of the 1951-52 school year, they said, the schools were graded on existing sanitary conditions. By May 1952 they had showed an improvement of 6.4 percent. The next year a "sanitation hour" was added which included such projects as lighting surveys, room and grade competitions, posters, and essays. By the end of the second year, school sanitation had improved citywide by 16.1 percent. School officials have since accepted the responsibility of carrying on this work, they said.

In another presentation, Charles L. Senn, sanitation director of the Los Angeles City Health Department, compared self-inspection plans with fee-for-service charges, and

pointed out that at present several different inspection agencies cover the same territory with a concomitant duplication in costs.

Inspection by management of its own establishment as a part of regular supervision, he said, is a most desirable form of self-inspection. Utilization of the services of consultants and fieldmen provides a level of service superior to that usually available through an official agency, Senn observed, but he warned that self-inspection is not a satisfactory substitute for periodic official inspections made frequently enough to determine reasonably that proper sanitation is being maintained.

Misconceptions Block Occupational Health

Four misconceptions stunt the local health officer's interest in occupational health, according to Dr. Harold J. Magnuson, chief of the Occupational Health Program, Public Health Service.

First, he said, occupational health still has a limited connotation for many people, who restrict it to mine, mill, and factory. It should be applied to every place people work, including the farm.

Second, many confine occupational health to the identification and control of harmful exposures in the workers' environment. It should be extended to embrace the idea of maintaining the health of the employed. Moreover, Magnuson argued, local health officers should look upon occupational groups as potential action bodies needing help to solve their general health problems.

Third, industry is too often considered separately from the community. As a result, both industry and the health department suffer through a failure in communication, he observed.

The fourth misconception is that an occupational health program must necessarily be a specialized and separate activity of the health

He credited the SSA's Medical Advisory Committee, drawn from medical and allied professions outside the Government, with invaluable assistance in the development and refinement of OASI policies, as well as in the explanation of methods and objectives to the profession.

Retarded Learn to Earn in Hartford Project

More than half of the mentally retarded adults enrolled in a Hartford, Conn., project were trained to earn a living in competitive or sheltered employment, reported Dr. Alfred L. Burgdorf, director, Hartford Health Department, and Alice Moore, coordinator, job training program, Hartford Association for Retarded Children.

Over a 29-month period 46 persons were admitted to the project: 17 demonstrated ability to work in competitive employment; 8 had ability to work in sheltered employment; 11 proved incapable of benefiting from training; and 10 were still in training. The total earnings of those employed are \$23,000; total cost of the program is \$43,500, the authors said.

Trainees were limited to persons 16-35 years of age with I.Q.'s ranging from 50 to 75, who were sponsored by the bureau of vocational rehabilitation, Connecticut Board of Education, and who could travel alone.

The project was initiated in 1956 by two voluntary organizations, the Greater Hartford Association for Retarded Children and the Hartford Rehabilitation Center. The center's physical facilities, provided by the city, are located at the site of the city hospital, operated by the welfare department and the health department. Health department staff members are active in both voluntary organizations and confer frequently with the center's staff.

Training Procedures

Medical and psychological examinations, admittance interviews with prospective trainees and their families, and prevocational exploration and appraisal preceded the actual training. The training included placement in the center's industrial workshop and subsequent placement in the city hospital or in an on-the-job training location.

Individual and group counseling, classes in posture training, continuing evaluation and planning, medical review, and group sessions with trainees' parents were held concurrently with training.

According to the authors, the results indicate that retarded persons may be too immature at 16 years for job placement, and that consideration should be given to requiring those with a certain I.Q. to continue

in school to a higher age. I.Q. levels, they found, were not a completely reliable index; the ability to conform to socially acceptable standards of behavior and be socially independent is necessary.

More extensive psychological testing and prevocational exploration and appraisal were needed. Trainees lacked familiarity with actual work situations and had to acquire work habits and skills before they could be transferred to job training.

The city hospital and a super-market proved to be useful on-the-job training locations for those who lacked the dexterity and coordination for factory work.

The authors felt that in a metropolitan area, combined planning and programming by voluntary and official agencies provide services of a caliber neither could produce individually.

Records and Statistics . . .

Hospital Records at Odds With Interview Data

Comparison of hospitalization data obtained in a household interview with data from hospital records reveals marked discrepancies, which increase in magnitude as the comparison becomes more specific, reported Dr. Barkev S. Sanders, medical economist and statistician, Public Health Service.

His major interest in this comparison, Sanders declared, is not as a test of the validity of household survey data on hospital utilization, but rather as a measure of the reliability of other information commonly collected in morbidity surveys. We lack appropriate criteria for direct evaluation of this other information, he pointed out.

Using the hospital records as the basis for appraising the household survey data, the study found an error of 8 percent in number of individuals hospitalized. For number of

days hospitalized, the two sources gave an identical figure for only 53 percent of those hospitalized. For 44 percent of the admissions, the two sources agreed as to number of days, and the total days for these cases accounted for 40 percent of the days of hospitalization shown by the hospital records.

It was observed that if the object is to obtain average measures of hospital admissions, or days of hospital care, or hospital stay per admission, the differences are much less because of the compensatory character of the errors. For example, 19 individuals were reported hospitalized by the household survey but not by the hospital records, while 25 were reported hospitalized by the second source but not by the first.

Perhaps more important for appraisal of morbidity surveys in general, Sanders indicated, the study revealed a host of factors that seem to affect the level of agreement:

and his physician in evaluating his health, Petrie said.

The health service offers no medical care other than first aid, he pointed out, and all employees who are found to have a health problem are urged to see their private physicians, to whom the results of the tests are reported if desired.

The employees' health service differs from the usual industrial medical department in that the latter's services are normally saturated by 10-25 percent of the workers who are repeaters. The employee's health service, Petrie said, tries to reach the other 75 to 90 percent with an educational program designed to keep them healthy. Petrie estimated that 90 percent of those referred to their private physicians would not have gone had it not been for the screening and health education message that went with the tests.

Protocol Cited

A protocol for promoting an occupational health program for local government employees was unanimously approved by the Georgia Association of Local Public Health Physicians in May 1958, Petrie said.

The protocol gives a formula for estimating the financial value of a reduction in sick leave. The health service would only have to reduce sick leave by 0.175 sick leave hour per 100 man-hours worked to offset the cost of the service, Petrie observed.

Preventing illness, Petrie concluded, means maintaining the productive capacity of our labor force and the wealth that is so vitally needed to continue services. For these reasons, he said, no one, especially a health department, can afford to ignore the opportunities of the occupational health approach.

OASI Disability Ineligibles Present New Dilemma

The handicapped citizen who is denied disability benefits but who is nevertheless rejected by prospective

employers as unemployable presents a serious dilemma, declared Arthur E. Hess, assistant director, Division of Disability Operations, Bureau of Old-Age and Survivors Insurance, Social Security Administration.

The situation, he indicated, is the result of two different points of view. On the one hand, the OASI disability program has as its key-stone "medical determinability." Under this concept it must deny disability benefits to handicapped persons who, from a clinical standpoint and in light of their age, education, and personal characteristics, have enough physiological or functional reserve to perform any substantial work.

An employer, on the other hand, even though he may recognize a valid social need, is concerned primarily with what the job candidate can contribute. He may decide that the candidate has "too little capacity for work left to regain his place in the industrial community."

Hess suggested a two-pronged approach to the predicament: One, expand medical and other resources or marshal present resources in such a way that disabled citizens may receive more effectively the advantages of modern medicine and related services. Two, stimulate employers, labor organizations, and community agencies to explore new avenues of productive activity for persons with limited work capacity.

Applicants denied disability benefits admittedly have characteristics that militate against reemployment, Hess said. For example, they are, on the average, 59 years old, an age at which even the nonhandicapped worker has difficulty getting a new job. In addition, they are in relatively poor health, lack skills, and are victims of academic poverty.

These handicapped persons, moreover, have proved poor prospects for vocational rehabilitation, according to Hess. The law requires that all applicants for disability benefits be referred to State vocational rehabilitation services. However, the "vast majority" of those denied benefits, as well as 94 percent of those whose

claims are granted, are not accepted for VR services, he said.

Assessment of an individual's employment prospects, Hess noted, must take into account not only his physical and mental limitations but also the employment opportunities in the community and the capacity of the local VR facilities. Since VR resources are not unlimited, only the best candidates can be accepted.

He believes that new kinds of restorative services may be needed. Those for whom remunerative work is not feasible may nonetheless profit from social or medical services that would make them better able to take care of themselves, he observed. He assigned directly to the community the major responsibility for seeing that handicapped persons do not become "forgotten people populating a no man's land."

Definition of Disability

Explaining further the statutory definition of disability, Hess emphasized that the inability to work refers to the inability to do "any substantial work," not merely the kind of work last engaged in or the kind for which the applicant is most obviously suited.

The definition also makes clear that the disability must be a physical or mental condition that can be determined objectively by medical examinations or tests and that the disability must be the primary cause of the individual's inability to work. Finally, the disability must result from a condition that has persisted for at least 6 months and that can be expected to continue for an indefinite time.

The decision regarding a claimant's eligibility for benefits, Hess pointed out, is based primarily on clinical and laboratory findings. The necessary data are normally presented in the applicant's medical report, but in some instances supplementary information may be obtained in an examination ordered by the social security agency. Under no circumstances is the claimant's physician asked to certify that his patient is "disabled," Hess said.

Borksy and Sagen inferred that the indifferent response by those in the high socioeconomic stratum reflects a lack of interest in any health service not offered by a personal physician.

Health Insurance Data Acclaimed as Sound

The scientific basis of the data on health insurance coverage published annually by the Health Insurance Council justifies their prominence, in the opinion of David Robbins, assistant director of statistical research, Health Insurance Association of America, New York City.

The data are collected in three separate annual surveys and put together by the council staff, Robbins explained.

One survey, conducted by the council itself, obtains data from insurance companies. Another provides data on Blue Cross, Blue Shield, and medical-society-sponsored plans; the national bodies of these groups collect data from each plan and forward the results to the council. The third survey, conducted by the Division of Program Research of the Social Security Administration, reports coverage through independent plans.

For its survey of insurance companies, the Health Insurance Council, in January each year, mails two questionnaires to each company underwriting accident and health insurance, of which there are currently some 700. One questionnaire asks for data on group insurance and the other for data on individual policyholders. Totals for various types of coverage—hospital expenses, surgical expenses, nonsurgical basic medical expenses, major medical expenses—are segmented into persons insured and dependents of insured. The data are also distributed by State.

The response rate for this survey is so high (covering 86 percent of premiums written in 1957), Robbins maintained, that little atten-

tion need be given the possibility of bias. Estimates of persons covered by nonreporting companies are derived from published information.

Of major concern in determining the extent of health insurance coverage is the possibility of counting the same person more than once, Robbins indicated. To measure the amount of duplicate coverage, the council conducts periodic investigations, he said, mentioning the following studies:

- Analysis of 1,000 consecutive applications for insurance and 1,000 consecutive claim applications with 45 of the leading writers of individual accident and health insurance.

- Information from representatives who install and service group contracts in six leading companies whose business represents more than two-thirds of the total group insurance in force.

- Analysis of several thousand hospital admissions in selected areas of the United States.

Duplication factors derived from such studies, Robbins stated, are split on a judgment basis into duplication within the insurance business and duplication between insurance and other coverages. In determining State figures, it is assumed that duplication is higher in States having a higher proportion of the population covered by the particular type of insurance than in States with a lower proportion.

Colleges Plan Curriculums In Vital Records Science

Vital records, which 50 years ago were used mainly in the mass as public health aids, now serve extensively as individual evidentiary documents.

This change was attributed by Dr. A. W. Hedrich, formerly chief of the division of vital records and statistics, Maryland State Department of Health, to social legislation covering, for example, child labor, adoption, school entrance, and social security.

Twenty-two years ago, the Maryland Vital Records Office issued fewer than 2,000 certified copies per year for evidentiary use. In 1957, he said, more than 55,000 copies were demanded.

Hedrich believes that, since the health department is still custodian of these records, it should set up an advisory board to aid in adapting the records system to all major social needs.

Illustrating the growing complexities of records administration, he compared the former simple omission of father's name from the illegitimate child's certificate with current practices which reconcile conflicting interests of child, mother, natural father, and others concerned. Handling of death certificates also frequently demands acumen in psychology, law, and administration.

To train executives to cope with the complex questions arising from the broader social functions of the records, a number of schools of public health have jointly scheduled an exploratory course for the summer of 1959 at the University of Michigan in Ann Arbor. The outcome, Hedrich said, will aid the schools in setting up curriculums leading to a master's degree with a major in the science of registration and recording of vital events.

Operations Research Meshes Alien Data

An operations research philosophy should be adopted in using statistical data to solve administrative problems, according to Dr. W. V. Charter, director of the Medical Statistics Division, Department of the Navy.

A key point in the process is "the 'meshing' of data from seemingly unrelated reports," he said. As an example, he referred to his division's use of data from three separate reports in determining optimum allocation of medical officers to hospitals: report of beds and patients, outpatient report, and staffing re-

place of residence; age, sex, and marital status; recency of hospitalization, cause for admission, and length of stay; occupation and family income; age, sex, and educational level of respondent; relationship between patient and respondent. Also, the level of agreement varied considerably among interviewers.

Sanders has concluded that there is need for improvement in household surveys, "especially when the object is to establish interrelationships between, for example, income and illness or illness and occupational pursuits or, even more so, when an attempt is made to correlate health status with volume and type of medical service received."

The type of analysis represented by this study, he said, provides clues as to how the quality of information collected in household surveys might be improved. In the meantime, he urged statisticians to consider carefully the purposes for which morbidity surveys are to be used in order to assess permissible tolerance levels.

The study was conducted in a rural county in the Great Plains area, with about 1,100 families participating.

Ma and Pa Give Survey Consistent Answers

Household respondents answering survey questions for the man of the house gave approximately the same replies as the man himself, reported Philip E. Enterline, chief statistician of the Heart Disease Control Program, Public Health Service.

Enterline set up an area probability sample in six counties of North Dakota in 1956 to test the validity of information provided by household respondents in health surveys. An enumeration of the dwelling units in the sample identified 1,886 men 35 years of age and over. One-third of the men were not at home when the interviewers first called. Information on one-half of these,

selected at random, was supplied by household respondents, 93.1 percent of whom were wives of the men. The interviewers revisited the other half until the man could be found at home and interviewed for himself.

Questions were asked about the men's personal characteristics, work history, food habits, cigarette smoking, illness, medical care, health symptoms, and characteristics of parents.

In only three places, Enterline said, were the differences significant at the 0.05 level. Household respondents reported more histories of rheumatic fever for the men than the men reported for themselves. Men reported more histories of stroke for their mothers than the respondents reported. And the men estimated fewer grams of fat in their daily diet than were estimated by the household respondents.

Enterline pointed out that it would be difficult to generalize about the biases in health information provided by household respondents regarding others in the household, because answers probably vary with the characteristics of the respondents and with the disease under consideration. But, he said, for the type of questions used in the North Dakota health survey, the replies of household respondents will probably result in no less disease reported in total and in broad disease categories than would be the case if each adult were interviewed for himself.

They Wouldn't Say No They Didn't Say Yes

Free health examinations appeal less to old people than to those in any other age group, reported Paul N. Borsky, senior study director, National Opinion Research Center, University of Chicago, and Dr. Oswald K. Sagen, chief, special studies, U.S. National Health Survey, Public Health Service.

The reluctance of old people to

commit themselves to an appointment for an examination following household interviews was revealed by a sample of persons interviewed by the National Health Survey. These people were offered a free health examination and at a later date were reinterviewed to determine why they accepted or refused or if they had changed their minds.

Borsky and Sagen said that those who refused health examinations at both interviews were relatively well satisfied with their health and the status of medical research, reported fewer chronic illnesses, and considered it less important to assist this study by cooperating. Relatively few, the authors related, expressed any desire to see a doctor or thought that their illness would impose a difficult financial burden on their families. From their reading, radio, and television habits, it was apparent they were relatively disinterested in health matters. They also had less faith in doctors, tended to diagnose their own complaints, and had higher incomes than those who agreed to come for free examinations.

Those who refused an examination after having agreed to have one reflected many of the attitudes of those who persistently refused. Their interest and concern about health matters, however, was lower, and they tended to be concentrated at the two extremes of age, income, and education, Borsky and Sagen said.

The authors explained the change from refusal to acceptance resulted primarily from accepting a proxy answer for someone absent at the first interview.

Those who cooperated consistently with the survey, Borsky and Sagen observed, generally take their health and the consequences of illness seriously, believe that research should be supported and improved, come from the middle group of age, income, and education, report more chronic illnesses, and have confidence in their physicians. They include a relatively high proportion of nonwhites.

Medical and Nursing Care . . .

Health Service Coordination s Theme of Administrator

From a world perspective, one cannot help but observe a trend toward more and more socially organized and financed health service, stated Dr. Milton I. Roemer of Cornell University, emphasizing that this is an observation, not an advocacy. If valid, this observation means, he said, that the need for health service coordination at the local level will become more and more manifest, both to the technicians and to the public.

Roemer, director of research at the Sloan Institute of Hospital Administration, strongly supports "unified health administration in general and health department participation in medical care programs in particular." He believes that such arrangements are most likely to incorporate prevention into day-to-day medical care administration and to give appropriate emphasis to the various health needs.

Also, Roemer maintained, unified administration can permit use of the highest caliber administrative skill at the lowest total cost; it can strengthen the competitive position of health services in the arena of government and in the larger arena of total national goods and services that must be financed; and, most important, it allows individuals to be served as whole persons.

Four Administrative Patterns

In examining health service organization, with particular attention to relationships between public health and medical care administration, Roemer grouped countries into four categories, according to their predominant administrative pattern: free enterprise, social insurance, public assistance, and universal service.

In the free enterprise system, which is predominant in the United States, Canada, and Australia, the

health department, particularly the local agency, tends to concentrate heavily or exclusively on administration of preventive services, Roemer said. Health insurance is administered mainly by voluntary societies; general hospitals are usually controlled by local voluntary groups; and health centers are ordinarily buildings for housing health departments, rather than places for ambulatory health care.

Countries of western continental Europe, Japan, and Israel provide most medical and hospital services for most of the population through social insurance systems. Physicians giving home and office care remain in private practice and receive fees from the insurance funds, but hospitals are predominantly governmental, under local or provincial authorities, with most medical personnel employed by the hospital administration. (Israel, with its salaried insurance physicians in health centers, is exceptional.)

Under the social insurance pattern, Roemer pointed out, the health department has little connection with administration of the health insurance funds, which are usually supervised by the ministry of labor or of social welfare. Some social insurance institutions have started their own preventive service, while in Scandinavia salaried district health officers provide medical care for the rural population.

Hospitals come under much greater public health supervision where social insurance of medical care applies, Roemer observed. Typically, he said, the health ministry has a division for hospital supervision, and the provincial health officer is responsible for operation of all public hospitals in his area.

The public assistance pattern is found principally in Asia, Africa, and Latin America, stated Roemer. For the majority (but not all) of the population, medical services are provided free by the government and financed from general revenues.

Most of the services are given by salaried personnel working in hospitals, dispensaries, or health centers.

The administrative pattern in these countries, Roemer continued, vests wide authority in the health department. The national health ministry is ordinarily responsible for all curative as well as preventive services; the provincial and district health agencies usually administer the hospitals and also provide ambulatory medical care.

For the relatively small middle and upper classes in the cities there are private hospitals and private physicians, Roemer observed. He noted also, that the health insurance idea has recently been spreading in Latin America, particularly in Chile, where 70 percent of the population is now covered.

The Soviet Union and other communist countries, Great Britain, and New Zealand were classed as universal service countries. Virtually complete medical care is provided as a public benefit for all persons. Almost all hospitals are owned and operated by the central government; almost all personnel are under contract with the government and are paid with funds derived mainly from general revenues.

In the Soviet Union's scheme, Roemer reported, the health ministry has authority over all preventive and curative health services, and all personnel are on full-time salary.

In Great Britain and New Zealand, the focus of authority in the health department is less sweeping. At the national level, the ministry of health does indeed, Roemer stated, have full authority, but at lower levels, other bodies than the health department have responsibilities. Hospitals and specialty services are administered by regional boards, and ambulatory care, by local executive councils, both of which are responsible to the national health ministry. The local health departments provide traditional preventive services, along with certain auxiliary curative functions.

Significantly, Roemer said, the need for coordination of all these

port. Each is submitted in order to measure a different aspect of the Navy's medical program. By relating the data something new is produced, he said, something not originally intended when the reporting system was set up.

To illustrate how statistics can serve as a tool for managerial control, Charter described in detail the procedures his division follows in estimating requirements for medical officers for hospitals. The objective, he pointed out, is realistic requirements, within the limits of personnel ceilings and other practical considerations, not what would be desirable under ideal circumstances.

Physician-patient ratios for each of several categories of patients have been developed, and each quarter these are applied to the reported workload of each hospital. To avoid a purely mechanical approach, however, individual situations are always considered, he remarked.

The estimates, Charter claimed, are "a good starting point and a good basic tool for physician allocation." He listed the following three ways in which they can be used:

- As a means of comparing hospitals to see whether any are relatively understaffed or overstaffed.
- As a measure of the validity of requests for personnel increases sent in by the hospitals.
- As a guide to allocation of medical officers when the total number of personnel is increased or decreased.

The value of our functions lies in obtaining current data, making systematic computations and evaluations, and presenting the data and statistical analyses in meaningful terms, Charter concluded.

Review Tightens Reports On Obstetrical Needs

Ways to produce reliable reporting of pregnancy and neonatal facts were defined by Dr. Samuel Shwartz, chief of the community standards

division, bureau of maternal and child health, and Howard West, chief of the biostatistics and health education division, District of Columbia Department of Public Health.

Since 1940 in the District of Columbia a medical supplement to the birth certificate has carried such data, they explained. After a study in 1952, these changes were made:

- The questions, attached to the face of the certificate, appear in check-box design. They can be answered within 2 or 3 minutes.
- The items deal with subjects the physician can answer readily. They call for factual rather than judgmental responses. There are no items for which short answers are not meaningful.
- There is a periodic review of reporting by individual hospitals. Those institutions consistently reporting poorly are notified and later visited to iron out flaws in procedures. Items answered poorly by most hospitals are reviewed for reconstruction.

• For birth certificates of doubtful character, a form letter is sent to the hospital of birth asking a recheck of data. Also, information on a sample of birth certificates is matched periodically with data in corresponding hospital records.

Interpretation of the data for identifying unmet needs is still in an exploratory stage, they said. It is already clear, however, that the neonatal mortality for live births in which mothers received no prenatal care was about $2\frac{1}{2}$ times as great as for all live births. Low economic status was not a factor, since similar proportions were found in figures from a municipal hospital limited to the medically indigent.

Prematurity, rather than complications of pregnancy, was the major factor in neonatal deaths where prenatal care was lacking, they found. Of all mothers with neonatal deaths, 41 percent had pregnancy complications. But among such mothers who had no prenatal care, only 23 percent had pregnancy complications.

Values Human Judgment Above Punchcard System

Punchcard evaluation systems are highly useful, but they are no substitute for personal judgment, commented three members of the Philadelphia Department of Public Health.

P. W. Purdom, director, and Dr. Morris A. Shiffman, chief of milk and food, division of environmental health, and Dr. F. Herbert Colwell, director of the office of statistics and research, made this remark in connection with an evaluation of their activities in food sanitation.

They offered two general observations on evaluation. First, no method of evaluation will serve all purposes, and second, there is a tendency to produce more data, tables, and charts than can be analyzed, obscuring thereby the important facts.

In accord with these observations, they have developed three evaluative systems using routine records, time studies for personnel in the field, and sampling studies of fieldwork. In addition, they said, they have reduced and simplified the procedures of collecting data. For example, they pointed out, a punchcard for each inspection is unnecessary; a random sample is sufficiently accurate for evaluation and reduces the processing of data by 80 to 90 percent. Furthermore, they found that comparisons of data on an annual basis showed trends more reliably than comparisons on a monthly basis.

The value of coding all time spent on field visits, they said, lies in the accuracy with which unit and program costs are determined for budgetary purposes and personnel productivity for management purposes. But, they cautioned, time measures effort, not accomplishment.

They also observed that it is impractical to evaluate some activities. For example, a pure food education campaign cost \$5,000. A scientific evaluation of the campaign's effectiveness would have cost \$35,000.

certified specialist, not one had a clear understanding of the medical diagnosis and three were incorrectly diagnosed as neurotics, Koplin and his colleagues stated. The group of experts conducting the study concluded that the multiple hospital admissions were related to socioeconomic difficulties and to the lack of a satisfactory patient-physician relationship.

The medical care plan of the UMWFA Welfare and Retirement Fund provides hospitalization, medical and surgical care during hospitalization, and office care by specialists. Actually, with an average of only 1.9 admissions per person in a 5-year period, multiple hospital admissions appear to be a small problem among Alabama beneficiaries, they remarked.

At present, a patient being admitted to the hospital for the third time in 12 months or the tenth time in 5 years is a candidate for referral to a managing physician. To date about 350 such multiple admission cases have been selected for review, and 300 of the patients have been referred.

A basic feature of the managing physician service is the generous amount of time the physician spends with each patient. About 2 hours is set aside for the first visit, of which 60 to 70 minutes is spent in conference. The physician seeks to determine not only the patient's symptoms but his opinions or feelings about his symptoms. He strives to maintain an attitude of sincerity, respect, sympathy, and objectivity. Above all, the conversation is unhurried, and the physician avoids emotional reactions.

Following the conference, the patient receives a complete physical examination and indicated X-rays, consultations, and laboratory tests, and during this same visit, he is given a preliminary summary of the findings. At the end of the visit, the patient is promised continued care and given an appointment to return for a review of progress.

Three physicians serve as managing physicians. They are in prac-

tice by themselves, but are able to obtain consultations, X-rays, and laboratory tests easily and quickly because they are located in a building in which there is a clinical laboratory.

The apparent success of the managing physician service, Koplin and his associates said, suggests the need for further investigation of the influence of the scope and quality of medical service on multiple admissions and other hospital utilization problems. He would like to see a study, for example, of a managing physician service combined with comprehensive group practice care.

VD Control Among Youths Rated Priority Job

Public health nurses should give high priority to the venereal disease problem in family and school health services, according to E. Alice Clark, chief nurse consultant, Venereal Disease Branch, Communicable Disease Center, Public Health Service.

Her recommendation was based on statistics showing that gonorrhea ranks second and syphilis fourth among notifiable diseases in the United States, and that teen-agers and young adults comprise more than half of the infectious venereal disease victims. She ascribed 50 to 60 percent of these infections to casual relationships and another 25 to 30 percent to steady relationships short of marriage.

Equally disquieting, Clark indicated, are increases in primary and secondary syphilis in 23 States and late latent syphilis in 19 States in 1958, even though there was a decline in all syphilis for the Nation as a whole. She attributed today's latent syphilis to casefinding failure 4 or more years ago. Currently, there are an estimated 1.8 million persons with inadequately treated or undiscovered syphilis, she said.

Pointing to the gap in epidemiology created by a decrease in public diagnostic and treatment fa-

cilities, Clark cited the necessity for health departments to provide epidemiological services for venereal diseases to private physicians similar to those offered for other major communicable diseases. She advised continuous application of control measures with emphasis on casefinding in high-incidence and high-prevalence population groups.

Within this framework, the general nursing service will be called upon more and more to assume responsibility for venereal disease control, she declared. In many agencies the nurses already include venereal disease epidemiology in their work, and in others plans are being developed to integrate venereal disease activities into a comprehensive communicable disease control program.

To carry out such functions, Clark concluded, the nurse must have a sound knowledge of the medical, public health, and epidemiological aspects of venereal disease. She must also understand that the venereal disease patient is an ill person, as much in need of medical and nursing care as the patient with poliomyelitis or tuberculosis.

Ill, Aged, and Disabled Need Homemakers

Illness or disability in a family is the main reason for the need of the services of homemakers, according to a 1958 survey by Maryland Y. Pennell and Lucille M. Smith, Division of Public Health Methods, Public Health Service.

Of 2,188 households in 32 States and the District of Columbia served by homemakers during a 1-week period, the largest proportion, 41.2 percent, were families with children requiring service because of illness in the home. Usually, care was provided for children because the mother was ill, but sometimes illness affected both children and parents.

The second largest group to be helped by a homemaker, 32.0 percent, contained an ill or disabled

activities at the local level is one of the British National Health Service's most pressing needs.

Train Nursing Home Staffs In Rehabilitation Skills

Training in rehabilitation given the staffs of nursing homes in a demonstration project in Illinois benefited approximately 90 percent of the patients, stated John A. Hackley, coordinator, rehabilitation education service, Illinois Public Aid Commission, Peoria.

He reported on the 3-year undertaking, begun in February 1957 and supported primarily by a grant from the Office of Vocational Rehabilitation as well as State and private foundation funds. Generally, 5 percent of the patients indicated potential for referral to vocational rehabilitation, 25 percent were discharged or were pending discharge from nursing homes, and 60 percent increased their ability for self-care and independence within the home in the course of the project. Attending physicians did not feel that 10 percent of the patients could benefit from the rehabilitation services.

The training program was designed to determine the rehabilitation needs of patients, how much can be accomplished by training existing staffs and enlisting the cooperation of local physicians and others in the community, what kind of training will give the staffs knowledge of rehabilitation techniques and a philosophy of physical and vocational rehabilitation, and the kinds of teaching materials that will increase staff competence in rehabilitation, Hackley said.

To participate in the project, nursing homes must join voluntarily, be currently licensed by the Illinois Department of Public Health, have a full-time registered nurse or licensed practical nurse giving nursing supervision, and have patients receiving public assistance. Approximately 20 percent of the State's

eligible nursing homes applied for the rehabilitation training. The two research-demonstration teams have completed work in 24 homes, ranging in size from 17 to 236 beds.

Team Approach

A team consisting of 2 rehabilitation nurses and 1 occupational therapist spends an average of 6 weeks in a nursing home. A daily 1-hour lecture is given for the entire staff; team members devote the remainder of their working hours to demonstrations, return demonstrations, and bedside work with individual staff members.

The team emphasizes the obligation of the nursing home to help define the patient's needs in the home and after discharge. It encourages the administrator or owner to work with agents in the local community to develop resources for comprehensive services to the patient and his family.

Through this approach, the administrator and his staff receive similar training; the staff can translate the training to the kinds of patients they routinely serve; the setting provides additional opportunities for recognizing and dealing with the motivation of the patient; the training team can demonstrate how the philosophy of rehabilitation must permeate every nursing activity; and physicians, who must prescribe rehabilitation for a patient before it begins, receive further interpretation of the nursing home's services.

The nursing home personnel, Hackley observed, developed a new motivation from the improved morale and health of the patients and a change in attitudes that attend improved technical skills. During monthly followup visits by the training team, they were eager to demonstrate gains their work had achieved with newly admitted patients. At first, the nursing home personnel were disappointed at the slowness with which long-term patients responded to rehabilitation services.

Too few administrators and med-

ical personnel appreciate the value of nursing care in rehabilitation, Hackley concluded. Rehabilitation is not the job of the rehabilitation center, the public assistance program, or the health department alone. It demands the coordinated effort of the patient, his family, the physician, public and private agencies, the hospital, nursing home, the day care center, and the sheltered workshop.

The rehabilitation service, which has been designated as a prototype by the Office of Vocational Rehabilitation, will be continued by the Illinois Public Aid Commission after the termination of the grant in December 1959. One State agency is duplicating this service and several other agencies in other States expect to undertake similar training, Hackley reported.

Improved Service Achieved With Managing Physicians

For a group of 76 "multiple hospital admission" patients referred to a managing physician, the annual hospital admission rate has been reduced by 44 percent and the annual rate of hospital days required, by 48 percent, reported Dr. Allen N. Koplin, Richard Hutchison, and Dr. Bruce K. Johnson, all with the United Mine Workers of America Welfare and Retirement Fund, Birmingham, Ala.

The key factor in these reductions is believed to be the definitive medical care and patient satisfaction achieved by the managing physician, they declared.

The managing physician service, in which selected patients are given special attention, was established by the UMWA Welfare and Retirement Fund in the Alabama area in 1956. The action followed a study of 18 patients admitted to hospitals 20 or more times in 4 years. The average number of admissions per patient for this group was 28 and the average number of doctors per patient was 6.

Despite the fact that all 18 patients had been seen by a board

sciences, experience in interviewing and developing interpersonal relationships, knowledge of her area, and community recognition of her functions make the nurse an ideal person to investigate communicable disease cases and outbreaks to find the source of infection and to help in preventing other cases, Lester said. The investigation is an integral part of patient care and family instruction.

Particularly significant are opportunities for strengthening professional relationships. Through

tactful approaches, patient interpretation, and effective service, the nurse can often influence the physician or hospital administrator to appreciate, respect, and utilize the services of the health department, Lester maintained.

Discussing the seriousness of communicable diseases today, she pointed out that they cause 1 of every 12 deaths. Before age 35, they rank second as the cause of death, being responsible for as many fatalities as motor vehicle accidents, cancer, and heart disease combined.

using 2 specially equipped buses, travels to population centers such as State and county fairs to screen groups of people. Chest X-rays, serologic tests for syphilis, blood sugar tests, and measurements of intraocular tension are offered.

Two county hospitals receive funds from the New Jersey State Health Department to employ a physiatrist, medical social worker, physical therapist, and occupational therapist for their restorative treatment units. A study of 188 admissions in one county revealed that the majority of the patients were improved and that many were discharged to return to the community, saving the cost of their maintenance, an estimated \$400,000.

The Hartford (Conn.) Health Department is the medical coordinator in the community's home care program, purchasing from existing agencies the services needed by patients. The Hartford Community Council is custodian of the project funds and coordinator of its non-medical aspects.

Nutritional practices in nursing homes were improved and a nutrition course for home administrators was started as the result of the Milwaukee City Health Department's survey of the food purchases by the homes and the food consumption of selected patients.

Peterson feels that health departments generally are neglecting health education, although they recognize the necessity for exploiting health education for casefinding and patient instruction. He also urged them to do research on the epidemiology of chronic diseases and in administration and program methodology.

Smokers Double Nonsmokers In Heart Disease

"After adjusting for age differences between smokers and nonsmokers, the reported incidence of coronary heart disease was more than twice as high among cigarette

Only the specific procedures for the detection of chronic diseases are new. Blood sugar tests in diabetes, tonometry in glaucoma, and cytology in cancer are employed whereas serologic tests are used for syphilis and tuberculin testing and X-rays for tuberculosis.

He attributed the insecurity about chronic disease programs voiced by many in public health and private medicine to recognition of the gross size and complexity of the problem, difficulty in accepting secondary prevention without hope of primary prevention, and resistance to the redirection of standard procedures and staff assignments and to the inclusion of new techniques in program activities.

Successful Programs

Peterson maintained that public health leadership and support are necessary in community chronic disease programs and described five such successful programs.

Chronic disease detection conducted by the District of Columbia Department of Health revealed significant findings in all but a small percentage of 5,000 screened from 1955 to 1958. And this health department's mass blood testing for diabetes identified 1.17 percent of the 96,366 persons tested as diabetic.

In Arizona, a staff of 8 persons,

Epidemiology . . .

Chronic Disease Programs Use Familiar Techniques

Chronic disease programs are not new to health departments, and neither are the requisite techniques of casefinding, followup, patient education, and patient services, stated Dr. Paul Q. Peterson, assistant director, National Institute of Allergy and Infectious Diseases, Public Health Service.

Tuberculosis, syphilis, leprosy, and malaria control have long been accepted as proper public health services, and State and local health departments have devoted funds and efforts to chronic disease control activities such as maternal and child health and dental health, he said.

The same administration and management, patient followup, and referral procedures are required for tuberculosis and diabetes. Patient education in chronic disease is based upon the same concept as patient education in maternal and child health. Crippled children's programs, dental health services, bedside care by visiting nurses, all activities familiar to public health, call for the same skills as services to the cerebrovascular accident patient, the arthritic, or the disabled aged, he stated.

person of advanced age at home. About one-eighth of such families also had a younger adult ill at home. About one-half of this group of households consisted of single, aged persons living alone.

In 16.7 percent of the households served, care was provided for well children, but the mother was usually absent, either dead or hospitalized. Households with illness of adults under 65 years of age accounted for 10.1 percent of those assisted by a homemaker. In the last instance, the homemaker enabled the patient to remain at home during convalescence or a chronic or terminal illness, Pennell and Smith observed.

The housekeeping tasks most commonly performed by the homemakers were house cleaning; laundry; planning, preparing, and serving meals; and marketing and errands. Activities included sewing and mending, reading aloud or playing games, and even assisting children with schoolwork. On occasion, the homemakers helped a family to move. In practically all families the homemakers gave personal care to children or to ill or aged family members.

For about half the families with persons ill at home, the homemaker provided at least one service directly for the patient. While some agencies encourage the homemaker "to do things for the patient," a few do not permit them to perform any service that involves direct contact with an ill or disabled person, Pennell and Smith reported.

They noted that one-tenth of the families with ill or disabled persons at home were not receiving services from either a physician or a nurse, and they questioned whether sufficient attention is being given to the health needs of these families.

One-third of the families with children were given about 40 hours of the homemaker's time and one-third of the adult families about 8 hours during the week. Only a few households without children were given as much as 40 hours.

At present, Pennell and Smith reported, about 150 agencies provide

homemaker services, engaging about 1,800 trained homemakers. Of the families in the study, 52 percent received services through voluntary social service agencies; 30 percent from departments of public welfare, through child welfare or public assistance programs; and the remainder, 18 percent, from independent voluntary homemaker agencies, visiting nurse associations, or health agencies.

Nursing Service Influenced By Changes in TB Practices

Fundamental changes occurring in tuberculosis treatment and case-finding are challenging some traditional practices, stated M. Estelle Hunt, chief nurse, Tuberculosis Branch, Division of Special Health Services, Public Health Service.

In attempts to adapt practices to advancements made since the advent of chemotherapy, many new approaches are being tried, she said, and we are continuing to move toward great events in the field of tuberculosis.

Reviewing the situation in tuberculosis today, Hunt emphasized the "wide divergence of practices" in regard to hospitalizing patients, duration of hospitalization, bed rest, use of special tuberculosis hospitals, protective measures, and case-finding.

Recommendations for bed rest, for example, vary from several months to "when the patient feels tired," Hunt noted. Length of hospitalization varies similarly, from as long as 2 years to as short as 3 months.

There is general agreement on the desirability of patients having negative sputum before discharge, she said, but there is disagreement as to other criteria.

In case-finding, emphasis is being placed on selection of groups expected to show a high yield, selection of the initial test (chest X-ray or skin test), and limitation of testing to numbers for which adequate followup is possible. Tuberculin testing

is useful in selected instances, but at present it cannot be considered an alternate method of case-finding, Hunt observed.

The trend in hospitals is away from small isolated tuberculosis sanatoriums and toward the coordination of hospital services. In some States small sanatoriums are being closed, and one large tuberculosis hospital is being used for the entire State. In other States, the tuberculosis sanatoriums are taking patients with other pulmonary conditions and certain chronic diseases.

These changes and variations are bound to influence nursing, Hunt concluded. She believes, however, that they require adaptation of present services rather than initiation of new or different activities. She believes also that nurses must acquire an understanding of what is happening and nursing itself must identify the modifications needed.

Another consideration of utmost importance, she maintained, is the need for improved communication among all agencies and individuals concerned with the tuberculosis patient.

Communicable Diseases Invite Nursing Skills

Satisfactions derived from active participation in a program for protection against communicable disease are second to none of those provided in nursing, according to Mary R. Lester, chief, Nursing Section, Epidemiology Branch, Communicable Disease Center, Public Health Service.

Such a program, she explained, offers opportunities for individual initiative, teamwork, interagency cooperation, and community effort. It includes patient care, isolation and quarantine measures, prophylactic treatment, immunization, epidemiological investigations, improvement of environment, and individual and group education.

Her training in the requisite

by the age of 60. After analyzing the association between lipid level and risk of coronary heart disease, Dawber and his co-workers concluded that "the total serum cholesterol is associated with the development of coronary heart disease, the association varying according to age and sex."

In the examination of the geographic distribution of new coronary heart disease cases within the town of Framingham, 1 precinct was found to have a lower incidence than the other 7, and far lower than was expected (1 case out of 96 as opposed to 7.5 expected), but the investigators could find no explanation for the low incidence in this precinct.

A breakdown by nativity, the main groups being composed of native Americans of British and Irish ancestry and immigrant Italians, failed to indicate "any association between nativity and the risk of coronary heart disease," Dawber said.

Finds Mortality Rate Low Among St. Louis Jews

The mortality rate for Jews in St. Louis and St. Louis County, Mo., is nearly 14 percent lower than the comparable mortality rate for the total white population of the area.

Kurt Gorwitz, former director of the St. Louis Bureau of Vital Statistics, reported this finding following a study of all Jewish deaths (1,478) and stillbirths (25) which occurred during 1955-57, in comparison with the deaths in the total white population in the same period. The study used records of three firms found to handle virtually all funerals of persons of the Jewish faith in this area plus data on all other funerals where Jewish services were conducted.

Comparative data were shown for the total white population since Jews were found to represent less than 5 percent of this group and since age-adjusted mortality rates

for the nonwhite population were substantially higher.

In the United States, Jews are believed to have a lower birth rate and to be somewhat older on the average than the comparable white population. This makes the disparity in the mortality rates even more striking, Gorwitz remarked.

Accounting for some of this difference in rates was the fact that both the estimated Jewish infant death rate and the estimated Jewish stillbirth rate are substantially lower than the comparable rates in the total white population. The annual Jewish death rate, Gorwitz found, was between 10.3 and 12.6, while the Jewish stillbirth rate was between 7.5 and 9.2. Among the total white population, the annual infant death rate was 20.7 and the annual stillbirth rate was 14.5.

For most causes of death, Gorwitz observed, the rates were considerably less for Jews than for the total white population: for accidents, 60 percent; cirrhosis of the liver, 72 percent; tuberculosis, 80 percent; syphilis, 29 percent; and suicide, 13 percent. Jewish rates were slightly lower for heart disease, cancer, and vascular lesions. They were substantially higher for diabetes and hyperplasia of prostate. The difference in the two cancer mortality rates is entirely accounted for by a much lower Jewish rate for the genitourinary site group. No Jewish deaths were found from cancer of the cervix. This, Gorwitz believes, may be due to the Jewish practice of circumcising the male infant.

In accidents due to motor vehicles or falls, Gorwitz found the same disparity that existed for the total accident figures. He felt that the difference in motor vehicle death rates may be partially due to "the general absence of alcoholism in our Jewish population," while the difference in falls may be due to more adequate care received by elderly Jews. No Jewish deaths were reported from acute alcoholism.

The mean age at death for Jews was 66.7; for the total white population it was 64.4. Data were not

available, however, to compute age-specific death rates and life expectancy figures, Gorwitz said. He found that a larger percentage of Jews died between the ages of 45 and 84 than in the general white population while a smaller percentage died in all other age groups.

Two Out of Three People Have CVR Condition

Two-thirds of the people who died in Hartford County, Conn., in 1954 suffered from some kind of cardiovascular-renal (CVR) disease, according to Robert J. Keehn, biostatistician, and Dr. Henry Eisenberg, public health internist, Connecticut State Department of Health.

Out of a total of 5,162 death certificates for 1954, 2,810 gave CVR as the underlying cause of death, and 637 others mentioned CVR, Keehn and Eisenberg said.

In this study, by which the authors sought to describe the frequency of secondary CVR disease present at death and the prevalence of these diseases in the general population, some of their main findings were:

1. Beyond the age of 1 year, existing CVR conditions are as likely to be the underlying cause of death in one age group as in another. The proportion of secondary CVR conditions (deaths not caused by CVR diseases but mentioning them) was lowest in the age group 1-24, and highest at 75 years of age and older.
2. The proportion of underlying non-CVR deaths with mention of a CVR condition in a given age group is the same for males and females, while underlying CVR is relatively more frequent among males.
3. A higher proportion of underlying CVR deaths was observed in nonwhites than in whites for each age group beyond age 25.
4. The relative frequency with which CVR disease is given as the underlying cause of death is similar for native- and foreign-born white persons at all ages.

smokers as among persons who had never smoked," commented Dr. William J. Zukel, of the Office of the Surgeon General, Public Health Service.

This finding emerged from a study in six counties in northeastern North Dakota in 1956-57, in which private physicians, the North Dakota State Department of Health, the North Dakota State Heart Association, and the Public Health Service participated. Dr. Zukel's co-workers were Dr. Robert H. Lewis, Dr. Robert C. Painter, Dr. Lloyd S. Ralston, Dr. Robert M. Fawcett, Philip E. Enterline, Alla P. Meredith, and Beatrice Peterson.

From the total population of 106,000 in six counties, a 10 percent probability sample consisting of 1,886 men 35 years of age and older was drawn and interviewed regarding their personal characteristics, habits, and occupation. During the following year, 228 cases of coronary heart disease developed from the total population of men 35 years of age and older; 160 of them had no previously diagnosed manifestations. They, or their survivors, were interviewed for the same factors, and in addition a detailed dietary interview was administered. This general interview and special dietary interview were also administered to an age-matched subsample of the 1,886 men initially identified, thereby providing controls representative of men in the general population.

Occupation seemed to be a factor in the different incidence rates obtained for smokers and nonsmokers. No appreciable difference was observed, Zukel said, between farmers who smoked and farmers who did not, but in other occupations the incidence rate of coronary heart disease was twice as high for smokers as for nonsmokers.

Moreover, Zukel pointed out, with regard to mild manifestations such as angina pectoris or coronary insufficiency, farmers and nonfarmers reported similar incidence rates. But the reported incidence of severe manifestations such as myocardial

infarction or death "was twice as high among other occupational groups as it was among farmers." And this difference was observed in every age group above 35 years.

Heavy physical labor was found to be inversely related to the incidence of coronary heart disease. "Men whose usual occupation required no heavy physical work," Zukel said, "have an incidence rate more than three times as high as those whose usual occupations required some heavy physical work." Unfortunately, he added, the information obtained by interview on physical activity appeared to be unreliable, and additional study will be necessary to obtain more precise information.

In comparing the detailed dietary histories for 162 of the 228 coronary cases reported and for 324 controls, Zukel and his associates found that regardless of how the cases were defined there were no significant differences between cases and controls in mean caloric intake, total fat consumption, or other major dietary constituents. This uniformity of dietary intake between coronary cases and controls, Zukel said, does not necessarily mean that dietary factors may not be important in the development of coronary heart disease, but it does demonstrate the probable importance of factors other than diet in determining why, in populations on relatively high-fat diets, some people have coronary heart disease and others do not.

Several Factors Related To Heart Disease

Education, smoking, and cholesterol levels were found to be related to the incidence of new heart disease cases in Framingham, Mass., in the sixth year of followup. No significant associations were discovered for nativity.

In the Framingham study, which will extend for 20 years, the National Heart Institute is investigating factors related to the development of cardiovascular disease. Dr.

Thomas R. Dawber, chief of the Institute's Epidemiology Section, worked with Dr. William B. Kannel, Dr. Nicholas Revotskie, Dr. Joseph Stokes III, Dr. Abraham Kagan, and Tavia Gordon in compiling and analyzing the sixth year data.

Nearly 5,000 adults, 29-62 years of age, who were free of coronary heart disease at the time the investigation began comprised the study group. The report was restricted to findings on men between the ages of 45-62.

As education increased, the incidence of coronary heart disease decreased, Dawber stated, adding that "even if allowance is made for the fact that younger men tend to have more education than older men, the trend remains unaffected." An excess incidence was confined to those who were graduated from but did not go beyond grade school, he said. These had a higher incidence, however, than those who did not finish grade school.

If all new coronary heart disease, excluding angina pectoris, is considered, Dawber pointed out, "an association of risk with cigarette smoking emerges, and this risk rises with the number of cigarettes smoked per day." However, he went on to say, "the mechanism by which smoking might be involved in the production of coronary heart disease remains obscure. There is no experimental evidence that smoking (nicotine) damages the blood vessels."

Dawber reported that in seeking some factor associated with smoking that might be important in the pathogenesis of the disease, a "most striking association" was discovered between the consumption of alcohol and the use of tobacco: as smoking increased, the amount of alcohol consumed increased, particularly in the lower age group. "Alcohol consumption per se, however, does not show any relation to the development of coronary heart disease," he said.

With regard to cholesterol levels and coronary heart disease, Dawber and his co-workers found the association strongest in young men; it seemed to disappear completely

throughout the stay in the hospital nursery.

The child will be given a psychological examination at 8 months and at 30 months to evaluate growth and development, a neurological examination at 12 months to screen for defects of the nervous system, a general pediatric examination at 42 months, and a final evaluation at 72 months which will include detailed studies of general physical and neurological status. In addition, interval histories of the child will be obtained every 6 months, Masland stated.

Since the 40,000 pregnancies may not result in a sufficient number of damaged children to yield significant conclusions, data on a larger number of such children are necessary. Information will be sought on other patients of the collaborating institutions and patients of other institutions and agencies in the localities of the research centers for this extensive phase of the project.

Masland asked for comments and suggestions on the methodology and organization of this phase, which is still being developed. Its success will depend to a considerable extent on the selection of key items of information required and on achieving methods of obtaining data from this extensive phase which are identical to, or at least comparable with, the same items derived from the intensive phase of the study, Masland declared.

Advocates New Concept, Prenatal Human Ecology

The concept of prenatal human ecology rather than pregnancy wastage should govern investigations of the influences upon acquired congenital anomalies, maintained Dr. Theodore H. Ingalls, professor of preventive medicine and epidemiology, University of Pennsylvania School of Medicine.

He feels the term pregnancy wastage is "scientifically a vast understatement" and that the main pat-

terns of causation emerging make it clear that the study of congenital anomalies embraces a great body of human ecology, not merely the products of pregnancy.

We are but on the threshold of the knowledge we need to protect the health at birth of future citizens, he said. Today's proof that controllable maternal illness may distort fetal development stems mostly from clinical observations made in the 1940's of the impact of rubella on the conceptus when the infection is acquired by the mother during the first trimester of pregnancy, he stated.

Ingalls called casefinding the bottleneck in acquiring the necessary knowledge. Not only are clinical manifestations of deforming disease in the embryo hidden, but the final pathological consequences seem relatively nonspecific. Congenital cataract, deafness, heart disease, and dental defects are not pathognomonic of rubella; they may be observed in babies with no maternal history of antecedent illness.

Also direct biologic relations between mother and conceptus are involved in the interrelations which have virological, immunological, embryological, physiological, and purely obstetrical facets.

As an example, he cited Asian influenza, a disease whose teratogenic hazard is unknown. Not only does it present casefinding difficulties similar to rubella, but maternal infection has no visible pathognomonic signs.

In Pennsylvania, where the occurrence of selected kinds of anomalies have been recorded on birth certificates for a decade, there is no evidence of a cause and effect relationship between Asian influenza in the fall of 1957 and congenital anomalies reported in the babies born 7-8 months later.

But influenza cannot be acquitted on the strength of such data. Birth certificates do not show the true extent of congenital heart disease at birth, nor are all cases of mongolism, cataract, and the like discovered in the first days of life.

Furthermore, all anomalies cannot be lumped together in order to test reasonable hypotheses. So many variable causes produce so many variable effects that some isolation of both anomalies and factors to be studied is necessary. For example, it is quite possible that maternal infection with Asian influenza may result in congenital deafness, as rubella did in Australia, but not influence measurably the occurrence of cleft palate. We just do not have the requisite data to test such speculations, Ingalls said.

Congenital defects involve much more than infectious agents. Recent studies indicate that testosterone injections of the mother during early pregnancy may induce anomalies of the perineal and genitourinary structures. And antithyroid drug therapy and carbon monoxide poisoning may be teratogenic agents. A woman experiencing diabetes while the fetal islets of Langerhans are differentiating may be suspect of initiating a disturbance of sugar metabolism in her unborn baby that may show up in the future.

Other significant metabolic, gynecological, systemic, anesthetic, traumatic, and X-ray-induced disorders of pregnant women are at least suspect of carrying a risk for the conceptus. The list of agents, combinations of agents, and degrees of activity is long and the list of possible consequences is longer still, Ingalls stated.

The appraisal is a challenge to medicine as much as to preventive medicine and public health. Every mother is an incubator for her own baby; gynecological and obstetrical techniques and knowledge should be applied to evaluate thoroughly pregnancies which result in the birth of deformed children, he declared.

Planned Parenthood Service In North Carolina

Over the past 21 years, a planned parenthood service has demonstrated its value as an effective part

5. No difference was observed in the relative frequency of CVR deaths or secondary conditions of CVR when classified by population sizes.

6. Among deaths resulting from non-CVR diseases, but with CVR conditions frequently mentioned on the death certificate, were rheumatic fever, diabetes, hyperplasia of the prostate, appendicitis, ulcer of stomach and duodenum, and pneumonia. Rheumatic fever had the highest frequency of mention (100 percent) and pneumonia lowest (50.6 percent) of this group of diseases. Together, they accounted for 24.5 percent of the mentioned CVR diseases.

7. Diseases of the arteries and nephritis and nephrosis formed a higher proportion of secondary CVR conditions than of underlying causes of death.

8. The prevalence of CVR diseases in the general population of Hartford County was estimated to lie between 10 and 23 cases per 100 persons.

Keehn and Eisenberg believe that with a knowledge of these prevalence rates, heart disease control measures can be established "on a sounder program, personnel, and financial basis."

Uses Family Members As Epidemiology Controls

Use of family members as controls to ascertain the etiology of disease was discussed by Dr. Arthur S. Kraus, chief of the division of vital records and statistics, Maryland State Department of Health.

Kraus employs a sample of new cases of disease with a control group consisting of family members, during a specified period. A member is eligible for the control group if he is free of the disease at the beginning of the period.

After pairing afflicted persons with their proper controls, Kraus tabulates the pairs according to a physical or environmental factor that is antecedent to the occurrence

of a disease and is presumed to be pertinent. A relative incidence rate is then estimated using the ratio of pairs in which the case has the antecedent factor and the control does not and pairs in which the case does not have the antecedent factor and the control does.

After presenting the theoretical constructs in such analysis, Kraus applied the method to the cases of heart disease which subsequently occurred in the Donora, Pa., population exposed to the 1918 smog. His findings confirmed and strengthened the previously noted association between acute illness during the smog and subsequently reported heart disease. Kraus speculated that the smog served primarily as a diagnostic screening test rather than as an etiological agent for subsequently diagnosed heart disease.

Kraus concluded that there are certain circumstances in which it is impossible or inadvisable to use the family control method. The method

should be eschewed, he advised, when (a) the antecedent factors are indeterminable after the disease has been diagnosed, (b) there are too few pairs of cases and controls in which the two differ with respect to the antecedent factor under study, and (c) the disease occurs predominantly or only in one sex under those conditions in which sex is associated with the antecedent factor, and spouses are the only available family member.

The advantages of the family method, when it can be applied, Kraus said, are (a) relative incidence rates can be estimated from comparatively small samples, (b) certain sources of positive relationships due to nonetiological factors can be eliminated, and (c) it is comparatively easy to find new cases of a disease and controls among family members to yield an estimate of a relative incidence rate that can be generalized to other families.

Maternal and Child Health . . .

Fifteen Centers to Study Reproductive Failure

Fifteen research centers will join in an intensive epidemiological study of reproductive failure, encompassing 40,000 mothers and their children from pregnancy up to age 6 years.

Dr. Richard L. Masland, assistant director, National Institute of Neurological Diseases and Blindness, Public Health Service, described the collaborative project, which is supported by Federal grants.

Its objective is to develop a series of examinations which will permit an evaluation of the independent operable variables during pregnancy and also permit detailed, accurate differentiation of the types of abnormalities observed. Extensive, detailed information will be col-

lected from the pregnant women, and their offspring will be observed and evaluated until they can be definitively categorized.

The evaluations in this prospective study will be based upon an extensive schedule of examinations, Masland explained. During the prenatal period data on the socioeconomic status, family history, and past medical history of both parents will be obtained, and gynecological and physical examinations and special serologic tests for virus infections during pregnancy will be conducted.

The process of labor and delivery will be observed, and pathological examinations made of the placenta and of any children dying at birth or during the course of the study. The neonate will be examined in the delivery room and periodically

and inconsistent in disciplining the children. In all these cases, if the opportunity had been available, the underlying pathology and poor adjustment might have been identified before the child entered school, Oppenheimer and Mandel observed.

They felt that their findings corroborated the belief, widely held in the professions engaged in helping children in trouble, that emotional disturbances do not occur suddenly. If the difficulties of adjustment of school children are to be considered intelligently, emotional disturbances and their background of tensions in parent-child relations must be recognized and treated in the preschool period, Oppenheimer and Mandel concluded.

Otitis Media Prophylaxis Used for Indian Children

Regular doses of sulfamethoxypyridazine were an effective prophylaxis for otitis media in a study of 120 Indian children reported by Dr. Paul R. Ensign and Mabel Moran, of the *City-County Health Department*, and Dr. E. M. Urbanich, County Welfare Medical Center, Great Falls, Mont. A prophylaxis was sought because a large number of Indian children in the Great Falls area had draining ears and earaches.

For the study the dose rate, varied according to the child's weight, was $\frac{1}{4}$ to $1\frac{1}{2}$ tablets or $\frac{1}{2}$ to $2\frac{1}{2}$ teaspoons of syrup each Monday, Wednesday, and Friday for approximately 6 months during the winter of 1957. Maximum age of the children was 11 years. The control group was composed of 130 children of similar ages on the welfare medical rolls of the county. Otitis media is defined as an infection of the middle ear resulting in draining ears or an earache of one night's duration.

Of those taking the medication regularly, 34, or the entire group, with no history of draining ears and 15 of 18 with such histories did not

develop otitis media. Eighteen children took the medication irregularly; none had draining ears during the winter.

Nineteen children had otitis media during the period of the study. Of these, 12 stopped taking the drug at least 2 weeks prior to the onset of the condition, 3 took the medication regularly but already had mutilated or destroyed eardrums, 2 took the drug irregularly, and 2 did not take it at all.

The authors found that the drug successfully prevented otitis media in children with draining ears, provided the eardrums had healed, but was less successful with children whose eardrums were destroyed or badly mutilated.

Although 23 percent of the study group had histories of draining ears compared with 14.6 percent in the control group, in the period of the study only 6.6 percent of them had draining ears, compared with 15 percent of the control group, the authors stated.

Family Health Clinic Unifies Obstetrics and Pediatrics

A clinic, reaching entire families with unified obstetric and pediatric services and using the skills of many disciplines, not only gave high quality care but also provided a vigorous resource for staff development, stated Dr. Pauline G. Stitt, assistant professor of maternal and child health, and Dr. Joan Babbott and Dr. Eva J. Salber, Milton Research Associates in Maternal and Child Health, Harvard School of Public Health.

The special family health clinic, a pilot project at Boston Lying-In Hospital, attempted to minimize artificial separations in the health services provided for families during childbearing and rearing.

The care provided by the clinic was based upon these premises: that pregnancy, childbearing, and child rearing are a continuum; that these processes intensify difficulties

and add new ones to daily existence; that the way in which these difficulties are met has an immediate and long-range effect; and that the services of the clinic should enable the family to master the crises of pregnancy and child rearing and derive strength from these experiences.

The clinic was open to mothers, fathers, and children and offered family-focused service. Obstetric, pediatric, nursing, nutrition, and social work services were provided to 116 families having their first babies and 25 of these families during subsequent pregnancies. A psychiatrist acted as mental health consultant for the project.

Obstetric, and pediatric services were provided with considerable flexibility. Pediatricians participated in early prenatal care; pediatric visits began a month after the baby's birth and continued throughout the first year. Families saw 3 or 4 staff members per visit, and, as far as possible, were cared for by the same personnel throughout their clinic experience, the authors said.

All observations on a family were assembled in a single unit record. The staff also pooled information on families in preclinic and post-clinic case conferences of the entire staff, in conferences between staff members and with the mental health consultant, and in administrative staff meetings.

The sharing of prenatal observations revealed from 6 to 40 pertinent clues per family, case analyses showed. Pediatricians were already well acquainted with the family when they started work with a newborn infant and thus could give custom-fitted counsel rather than general observations in dealing with behavioral situations and emotional disturbances. Warned by colleagues of impending family predicaments or present difficulties, they avoided unwittingly contributing to such situations.

The staff benefited from the association with persons of other disciplines. For example, pediatricians, collaborating with nutritionists, devised feeding practices geared

of the maternity care provided in public health clinics in North Carolina, stated Dr. J. W. R. Norton, director, Dr. J. F. Donnelly, obstetric consultant, and Anne Lamb, nursing consultant, North Carolina State Board of Health.

Although the maternal, prenatal, and late infant mortality rates for the State began to decline before 1937 when planned parenthood was added to maternity care in the clinics, the service has been a factor in the decline, according to the authors (see chart).

They described some characteristics of the service available in clinics in 74 of 100 counties in the State. The service is directed toward the production of healthier offspring who have a greater chance for survival and a greater opportunity of reaching their full potentialities by the spacing or the prevention of pregnancies because of medical indications or socioeconomic considerations, usually both.

Since its inception, the planned parenthood service has won acceptance quietly, without fanfare.

After the service has been explained to and approved by local health departments and county medical societies, county boards of health accept or reject it as a part of their maternal and child care.

Methods of providing the service vary. The patient may be referred to the staff of a hospital or outpatient department or to a private physician, or the health department clinic may provide the service under the supervision of its director or a private physician. Generally physicians and nurses have provided such services in a balanced maternal and child health program.

In recent years, 12 to 14 percent of the total number of women delivered in North Carolina have received prenatal care in public health clinics. In 1957 obstetrical patients averaged 3 prenatal visits per pregnancy, more than 40 percent returned for at least one postpartum visit, and nearly 20 percent were patients who had received instructions and facilities for spacing pregnancies.

The present practice is to discuss

family planning during the prenatal visits so that by the time of the postpartum examination the patient has had time to think about it and reach a decision, the authors explained.

The planned parenthood services of the public health clinics in North Carolina are as much a part of the maternal and child health care as physical examinations and laboratory tests, the authors declared.

Twigs Bent at Home Before School Begins

To prevent school children from developing behavioral disturbances, Dr. Ella Oppenheimer, chief, and Margaret R. Mandel, consultant in psychiatric social work, bureau of maternal and child health, District of Columbia Department of Public Health, advocated adding social casework and psychological and psychiatric counseling to the basic pediatric and public health nursing services of child health clinics.

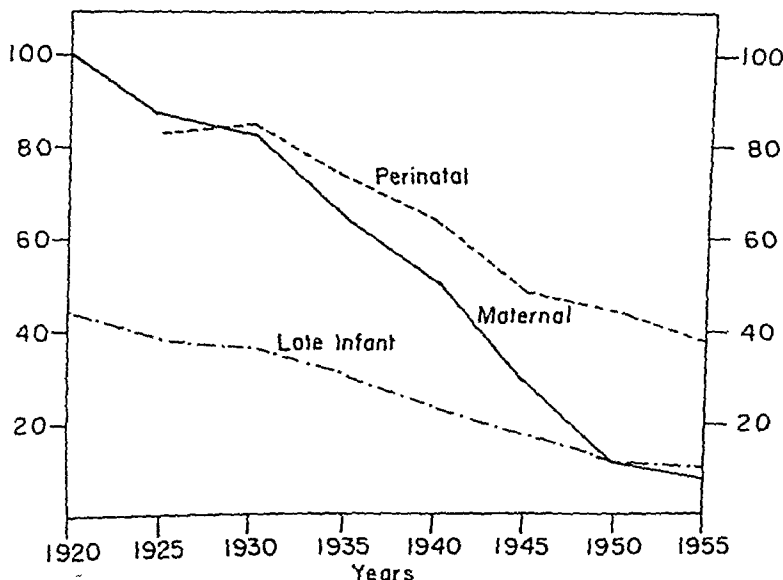
In a study of 60 school children, 32 showed evidence of emotional disturbance in the preschool period, 20 in kindergarten, 5 in the first grade, and 3 in the second grade.

Because of their disturbed behavior the children had been referred to the psychiatric, diagnostic, and counseling clinic of the school health services. The clinic, a limited pilot project staffed by a part-time psychiatrist and a full-time social worker, served school children with emotional problems.

The children ranged in age from 5 to 17 years; 41 were boys and 19, girls. Factors of organic origin, which could have been detected in the preschool period, contributed to the disturbed behavior of 14.

Among 18 illustrative case histories cited, 15 children had disturbed relationships with parents, siblings, peers, and teachers. In 9 cases parents had severe marital problems, in 9 the father was absent from the home most of the time or was a weak masculine figure in the family, and in 8, mothers were weak

Maternal, perinatal, and late infant mortality rates in North Carolina, 1920-55.



NOTE: Maternal mortality rates per 10,000 live births; perinatal and late infant mortality rates per 1,000 live births.

pediatric care of orthopedically handicapped children; and more continuity of care by the same physician seeing the child on each visit. The authors also found that the professional nursing time assigned to outpatient services could be used more productively in counseling patients than in carrying on routine activities.

The small number of clinics (6 out of 20) making referrals to public health and visiting nurse services indicated the need to strengthen this aspect of home followup. Although all the hospitals had good social service coverage on the inpatient service, only one-fourth had social service workers present or easily available during clinic sessions. Not only strengthened social services but also a closer liaison between the doctors, nurses, and social workers in making a medical social plan for patients were indicated.

There were no followup methods in 12 clinics and only poorly functioning ones in 2. An efficient plan for followup is applicable to all types of service and is essential to a well-functioning clinic, the authors stated.

Suggest Changes

Adults and children were seen together in the same clinic in 10 hospitals. The authors suggested that if a separate clinic is not feasible, a portion of the regular clinic should be set aside for children.

This grouping would enable the pediatric staff to observe children with orthopedic handicaps more closely resembling those seen in a private pediatric office than those seen in the inpatient service.

The upper age limit for children varied from 12 to 17 years. The authors proposed that children's clinics accept patients up to 17 years, the age of termination of growth and osseous maturity.

All clinics visited had an appointment system but only two had time appointment systems. Specific time appointment systems had been found unsuccessful but divided sessions

were very efficient. Sessions divided into early, middle, or late periods were recommended. In 13 of the 20 clinics, extra visits were necessary for X-rays. Only one hospital had a separate, adequate waiting room with good recreational facilities for children.

Based on the observations made during the survey of these 20 services, standards for orthopedic outpatient services are being developed by the New York City Health Department.

Pediatric Evaluations Of Indian Children

Pediatric evaluations of 214 Indian children of the Wind River Reservation in Wyoming indicated that their needs were similar to those of non-Indians of similar socioeconomic status, declared Dr. Georgia B. Perkins, medical director, and Gertrude M. Church, nursing consultant, Denver Regional Office, Children's Bureau, Department of Health, Education, and Welfare.

The pediatric evaluations included medical histories and social and emotional aspects of the child and his family as well as chest X-rays, detailed blood examinations, serologic tests for syphilis, rectal tapes, stool examinations, and a height and weight check of the children.

The evaluations, the authors declared, were more valuable to these families than multiple screening, because of the greater health education values that resulted and their greater validity in future health planning.

The families' cooperation and acceptance of the evaluations the authors attributed to previous visits by the public health nurse to explain the examinations and the followup. A review of medical, nursing, and social service records of the families prior to the evaluations was valuable, productive, and a good case-finding method, Perkins and Church noted.

The children, each accompanied

by an adult, were members of 60 families; 50 percent were Shoshones, 48 percent Arapahoes, and 1.4 percent were of other tribes. They ranged in age from less than 1 to 12 years.

Followup Needed

The evaluations, performed by 7 non-Indian pediatricians, revealed that 201 children required some kind of followup. Dental care was indicated for 135, although such care was available to them at the clinic on the reservation. The low level of immunizations completed—99 children lacked DTP immunization, 135 smallpox, 142 poliomyelitis, and 107 Rocky Mountain spotted fever—suggested that well child supervision was needed.

Medical care of some kind was indicated for 137 children. Of these, 64 had ear and hearing difficulties, including 37 with otitis media; 23 had visual defects including myopia and strabismus; 19, orthopedic abnormalities; 9, congenital abnormalities; 16, infections other than otitis media or intestinal parasites; 16, metabolic, nutritional, or endocrine disorders; 5, convulsive disorders; 3, indications of possible tuberculosis; 4, indications of possible cardiac abnormalities; and 1, mediastinal mass.

The 212 rectal tapes and 70 stool specimens examined showed that 21.2 percent of the children had pinworm ova, and 20 percent had pathogenic intestinal parasites.

Generally the children were somewhat shorter, particularly the Shoshones who were considerably shorter and also lighter, than their non-Indian counterparts. Because of this difference, individual growth histories will be necessary until tribal data on height and weight are available, the authors stated.

Assistance with social problems is one of the greatest needs of the Indians, according to Perkins and Church. Although only six children were identified as having emotional difficulties in the pediatricians' interviews with parents, the authors felt that possibly more intensive

to a child's motor, social, and adaptive development. Pediatricians and nurses jointly reexamined their pediatric and nursing practices in terms of their experience in the clinic. The data, selective perceptions, and interpretations of the social workers helped other staff members comprehend more completely the child's place in the family milieu.

The psychiatrist supplied a mental health perspective of family life. While alert to signs of incipient trouble, he contributed chiefly by making others aware of signs of family strengths and in showing the staff how to use those strengths to build a healthy family life.

The multidiscipline approach also helped to efface stereotypes the members of one profession had of another and led to improved communication, the authors stated.

They suggested that such a clinic may be valuable in raising standards of care in maternal and child health programs. In addition to their services in the clinic, participants carry over into other functions the insights gained during the experience. Methods, to a varying degree, can also be applied elsewhere.

Sound Planning Basic In MCH Services

Three considerations in the orderly development of maternal and child health care were listed by Dr. Edward R. Schlesinger, associate director, division of medical services, New York State Department of Health.

These are services which utilize personnel and funds efficiently; gradual increase in the depth of those services; and restriction of frank experiments or demonstrations to projects that are likely to become regular services. He cited as an extreme example of unsound planning, setting up a modern premature infant care center in a locality where mortality rates are

high among infants over 1 month of age. Services to insure safe milk and water supplies and instruction in proper infant care should come first, he said.

However, in these circumstances a modern premature center can focus attention on modern pediatrics in contrast to the conditions which led to the death of many full-term infants, Schlesinger added.

He contrasted the experimental demonstration, which tests new techniques or reevaluates existing ones and has a definite goal, with the service demonstration, which has a less definite objective or endpoint. A voluntary agency may demonstrate disease prevention or detection to gain support, but community acceptance may encourage the agency to continue the demonstration instead of switching its efforts to other health needs, Schlesinger said.

He described how a cooperative effort in New York State hastened the shifting of secondary prevention of rheumatic fever from voluntary to official auspices. For years, local chapters of the State Heart Assembly subsidized the prevention of recurrent attacks in rheumatic children. Only a few local health departments accepted State aid, made available a few years ago, to pay for drugs and services.

At a 1957 conference, State and local government agencies agreed that rheumatic fever prophylaxis should be an official responsibility. Since then, there has been a rapid shift toward health department support of secondary prevention.

Extending comprehensive demonstration programs in limited areas to an entire State is somewhat more difficult, according to Schlesinger. Ten years ago, a demonstration in premature infant care was started in two regions of upstate New York. Payment for care was envisioned as a means of improving care for premature infants throughout the area.

As the demonstration phase was concluded several years ago, premature infants were considered physically handicapped children under State law, and counties wanting pre-

mature infant care programs could obtain State aid. Although high standards in facilities and personnel were required for approval, all but one of the counties in the demonstration area elected to continue under State aid, and several additional hospitals were approved as premature centers.

Initially, spread of the program outside the demonstration area was slow because of the need to build community interest and the time required to renovate or construct premature nurseries and train pediatricians and nurses. But the program is gradually influencing a larger area of the State, Schlesinger said.

He concluded that selling communities on programs showing the greatest promise of results is more productive than developing services unrealistically to meet so-called "felt needs."

Child Orthopedic Clinics Surveyed in New York

Improved and broadened services to encompass early casefinding, medical and paramedical care, and efficient followup in 20 children's orthopedic clinics in New York City were recommended by Dr. Robert S. Siffert, senior orthopedic consultant, Margaret A. Losty, acting director, and Sylvia B. Snyder, senior social work consultant, of the bureau for handicapped children, New York City Department of Health.

In 1957 the authors, prompted by the steady decline in the inpatient census and the concomitant increase in the number of children being treated on an outpatient basis, surveyed 20 outpatient departments of the orthopedic services participating in New York City's crippled children's program.

The survey revealed the following needs: more closely integrated inpatient and outpatient care; strengthened medical service through increased attending and resident staffs in outpatient services; strengthened

He felt that the President's Council on Youth Fitness had been wise to resist demands for federalized testing standards and their routine, periodic application to all young people. Fitness, he maintained, belongs in the hands of the educators and physicians working at the local level who are deeply concerned with the health, welfare, and fitness of young people.

What is the measure of fitness, if it cannot be measured by any set of physical tests? he questioned. First we must ask, for what purpose do we desire fitness? Each person has

individual aims. He may seek success in a profession, a business, a sport, or an art. These are but superficial goals, which although desirable, are far from all of life, Bauer declared.

To be loved by our relatives because we are lovable, to be esteemed by our fellow workers because we are estimable, to be valued by our contemporaries because of our worth, and to be mourned when we are gone because our absence is a real loss; these are the real objectives in living and the real measures of fitness, Bauer concluded.

This finding was reported by Dr. A. L. Russell, National Institute of Dental Research, Public Health Service, and Dr. Polly Ayers, director, bureau of dental health, Jefferson County Department of Health, Birmingham, Ala., following a non-random socioeconomic study of 2,150 dentulous white and nonwhite persons, 15-74 years of age, in Birmingham.

In the periodontal examination of these people, each tooth was scored for dental caries and periodontal disease. In the latter instance, each tooth was graded on a scale based on the classical clinical signs of marginal periodontitis (inflammation, pocket formation, and loss of function). Among their other findings were:

- Periodontal scores become progressively lower as education increases.

- Periodontal condition is directly related to the degree of neglect (unfilled dental caries, for example) in both classes at all ages over 20. Disease was more severe as the degree of neglect increased.

- Scores were lower in those who enjoyed occupations high in prestige and income. For both white and nonwhite persons, the data suggest that education is more closely associated with periodontal condition than occupation is.

- There were no differences in the periodontal condition of white and nonwhite groups of equivalent socioeconomic status.

Russell and Ayers recommended that comparisons between white and nonwhite populations should be based on groups of equivalent socioeconomic status.

Dental Care . . .

Dental Neglect Varies With Social Class

The role of social class in forming attitudes toward dental care was accentuated in a pilot motivational study sponsored by the American Dental Association and carried out by a specialized Chicago firm. B. Duane Moen, director of the association's bureau of economic research, described the study as a pioneer effort.

Since direct questions do not usually give valid clues to behavior, said Moen, the sample of 126 men, women, and children representative of a typical midwestern community were stimulated to talk freely by such queries as, "What have been your experiences with dentists?" Sentence completion and picture interpretation tests were other devices.

Moen gave these results, grouped according to accepted classifications of social status:

- The upper middle class, professionals and business executives, with characteristic foresight, values dental services to prevent tooth decay or to defer it if unavoidable.

- The owners of small businesses, minor executives, teachers, salesmen, and white collar workers com-

prising the lower middle class take the typically moralistic view that dental care is a duty. Attractive teeth are important as a social asset.

- Those in the upper lower class, skilled and semiskilled blue collar workers, with a recent income rise, appreciate dental care far more than those in the next lower category. The best opportunities for behavioral and attitudinal changes are here.

- Members of the lower lower class show the most dental neglect, but not because of lack of information. Tending to live for immediate gratification, they consider dental care too much trouble.

Although dental health education is effective, the study pointed out that ways are needed to motivate people to related action. There is little reward associated with dental care, but much punishment from neglect. "Motivational efforts are mainly negative," it was concluded.

Oral Debris Indicted In Dental Study

Persons with obvious oral debris have substantially more periodontal disease than persons with relatively clean mouths.

Untreated Cleft Palates Compare with Treated

Tentative conclusions on the biosocial effects of unoperated oral clefts were reported by Dr. Frank E. Law, Division of Dental Public Health, Public Health Service, and Dr. John T. Fulton, professor of

medical social work would reveal additional social difficulties.

Findings in family medical histories of significance to the children included 3 women who were possibly prediabetic, 1 family with both parents diagnosed as diabetic, 2 families with histories of rheumatic fever, 2 with an unusual number of deaths among siblings of the child examined, and 4 with untreated tuberculosis in the household.

The pediatricians, estimating the reliability of the data they secured, felt they had obtained fair or good pediatric histories on 78 percent of the children and poor histories on 21 percent.

The authors concluded that by offers of similar evaluations and followup services to other groups, adult Indians may be persuaded to cooperate in assessing health status and in public health endeavors.

Multiple Antigen Booster Proves Effective

A booster dose of a multiple antigen has proved to be extraordinarily effective in increasing poliovirus immunity to high levels, declared Dr. C. Dale Barrett, Jr., director of maternal, child, and school health, Detroit Department of Health, and Dr. Eugene A. Timm, research virologist, Parke, Davis and Company, Detroit.

A series of inoculations of the antigen, containing diphtheria and tetanus toxoids and pertussis and poliomyelitis vaccines combined and adsorbed on aluminum phosphate, were administered to 224 children drawn from the child health clinics of the Detroit Department of Health.

Beginning in July and August 1956, children 6 months through 5 years of age received 3 monthly injections of 0.5 ml. per dose, and infants under 6 months received 4 similar injections. Booster injections of the multiple antigen were given 15-18 months later to 52 of the 224 children. At this time a control group of 51 children of corre-

sponding age range who, by history, had never been immunized with poliomyelitis vaccine, were admitted to the study and received a single 0.5-ml. dose of the tetravalent vaccine.

Antibody levels were determined from blood specimens taken prior to each injection and 2 weeks after the final injection in the primary series and the booster dose.

Prior to the first injection, 76 children had no demonstrable antibody to any type of poliovirus. Of these, 98 percent showed significant antibody response to type 2 poliovirus, 89 percent to type 1, and 69 percent to type 3 following the primary series.

Barrett and Timm found that the booster dose greatly enhanced the seroimmunological response to the poliovirus antibody and the response to the other components of the antigen. After the booster injection, more than 97 percent of the 52 children had high antibody levels to all three types of poliovirus.

According to the authors, this demonstrates that essentially all of the children benefited from the primary immunization, and that the antibody level demonstrable after the primary immunization cannot be the sole criterion for evaluating antigenic potency.

The relatively poor response in the control group of 51 children to the single dose of multiple antigen substantiates the conclusion that the marked response of those receiving the booster injections is truly a reinforcement effect, dependent on the primary series of inoculations, the authors stated.

Infants as young as 2 months of age responded to the primary injections with demonstrable antibodies to all antigenic components and reacted as well as the older children to the booster dose. After the fourth dose in the primary series, 80 percent of the infants exhibited significant levels of antibody with a marked improvement in the levels for each poliovirus type, compared with lower responses after the third dose.

No clinical reactions of any serious consequence were reported or observed, the authors stated.

Physical Fitness Held Not Sole Objective

Current emphasis on physical fitness is in danger of overshadowing the mental, moral, spiritual, and social fitness of the individual, stated Dr. W. W. Bauer, director of the bureau of health education, American Medical Association.

In accepting the William A. Howe Award of the American School Health Association, Bauer outlined a broad concept of fitness and suggested that mental, moral, spiritual, and social fitness deserve equal, if not stronger emphasis than physical fitness.

He noted a confusion between the concepts of health and fitness. "Can one be fit and not healthy?" he asked, and declared that he did not believe health alone constitutes fitness. Health can be passive, languid, mere freedom from disease. However fitness is inherently dynamic; it is hard to imagine a passively fit individual, he stated.

There is no question that health contributes to fitness, but can there be fitness in the absence of health? he asked.

He cited the celebrated epileptics Lord Byron and Julius Caesar, Chopin and Robert Louis Stevenson with tuberculosis, the alcoholic Stephen Foster, Lincoln with his black moods of depression, and Lord Nelson with but one arm and one eye as persons who surmounted disease and defects.

There have been demands for a series of exercise and achievement tests to measure the fitness of an individual, he said. Tests could be devised to measure physical performance. "It would, however, be the height of fallacy to assume that such a measurement of physical strength, endurance, and agility is any criterion of the total personality fitness of an individual to meet the challenge of living," Bauer stated.

provide for themselves, Aaron posed these questions:

- What constitutes minimum dental care essential for everyone and therefore for recipients of assistance?

- Is the program which is solely for emergencies pennywise and pound foolish?

- Do we know what added burdens inadequate dental care places on dependent children and on the disabled and the aged?

- Shouldn't the professions explore the effects of inadequate dental care on nutrition, speech, performance, and development of the individual's fullest potential?

- Do we need attitude studies of recipients, dentists, and the public to determine where we are and where we want to go?

Cinefluorography Facilitates Cleft Palate Therapy

Using cinefluorography with image intensification together with the sound spectrograph has proved invaluable in establishing presentable speech patterns for postoperative cleft palate patients, declared Dr. H. K. Cooper of the Lancaster Cleft Palate Clinic, Lancaster, Pa.

Interest at the clinic, he said, is focused on postoperative function of the structures involved because good physiological results do not always accompany a good anatomic closure of cleft palate.

The cinefluoroscope produces a moving picture which enables the therapist to study the physiological action of the pharyngeal muscles, soft palate, tongue, and lips. The sounds are reproduced simultaneously. The sound spectrograph converts the sounds of speech into a graph.

With this combination of devices, Cooper pointed out, the therapist is in a better position to diagnose the difficulties and offer a treatment plan for postoperative patients whose speech is faulty.

Study of the soft palate in nor-

mal function by "visible speech" proved that the greatest pharyngeal closure is always above the external tubercle of the atlas bone. Contrary to the theory that Passavant's pad is the point of greatest constriction of the superior constrictor muscle and that its forward movement is present in normal speech, cinefluorography showed evidence of this movement only in some instances where the palate is short.

Cinefluorography has been a decisive factor when redivision of the

soft palate was considered. It has also helped to decide whether to operate further or to advise construction of a speech appliance for a postoperative patient. Placing the appliance with a speech bulb always above rather than opposite the point of greatest constriction, the location of which is no longer a matter of conjecture, results in a better voice quality as well as a better velopharyngeal seal without disturbing retention of the appliance, Cooper stated.

Food and Nutrition . . .

Taste, Odor, and Cost Balk Food Irradiation

Russia is the first country to permit the sale of an irradiated food, stated Dr. L. E. Clifcorn, manager, central division research department, National Can Corporation, Barrington, Ill.

At the Geneva Conference on Peaceful Uses of Atomic Energy in September 1958, the Russians reported that on the basis of tests conducted the U.S.S.R. chief of public health inspection had authorized the use as food of potatoes irradiated with a 100,000 rad dose to prevent spoiling. The British reported that the destruction of *Salmonella* in frozen eggs appeared to be their most promising and compelling use for food irradiation.

Before American food processing companies can offer irradiated foods to the consumer, research must disclose what foods may be benefited by radiation and whether the benefits are sufficient to carry in the early stages the higher capital and operating costs and the costs of educating the consumer to accept foods having new sensory characteristics and possibly new cooking requirements, Clifcorn said.

He also pointed out that Food and Drug Administration approval must

be obtained before any irradiated food can be offered for civilian use.

Flavor and odor are the main problems, he said. The degree of off-flavor development is directly proportional to the radiation dose and can be controlled in some foods by irradiation in the frozen state, use of inert gas, or other techniques. For pasteurization treatment (200,000 rad or less) off-flavor is insignificant or less severe than for sterilization dosages, up to 4.5 megarad, required to destroy *Clostridium botulinum*. No residual radiation has been found in food even after it has been treated with 25 mev electrons.

Assuming food is to be irradiated at 2 megarad with a 50 percent energy utilization factor, a 10-kw. machine costing from \$100,000 to \$400,000 can treat 1,970 pounds of food per hour, Clifcorn said. The 10-year depreciation operating and maintenance costs are estimated at 2 cents per pound on an 8-hour single-shift basis. For sterilization at 4 megarad the cost is doubled. For low dosage treatment at 100,000 rad the cost drops to approximately one-tenth of a cent per pound, which is approximately the cost of steam-sterilization of the product of a single-line pea cannery. Low radiation doses are commercially the most attractive. Only expensive food

dental epidemiology, University of North Carolina.

Data on 124 native Puerto Ricans age 15 to 57 years were collected at 5 health centers. Of the 59 untreated subjects, 51 had cleft palates and 8 had clefts involving only the lip and alveolar process; 20 who had had surgical repair were included for comparison of treated and untreated cases, and 36 who had normal palates were included as controls for normal growth and speech of Puerto Ricans.

Law and Fulton said that the patients with unoperated cleft palates appeared to have developed well and their facial growth patterns were normal. Clinically the growth of the upper part of the face and of the dental arch was closer to normal in the unoperated than in those who had had early surgical treatment of the palate.

Better movement of the posterior pharyngeal wall during vowel phonation was indicated in the unoperated persons. These patients reported no more respiratory illnesses than the control groups, and although the turbinates were consistently abnormally enlarged, the eustachian tubes were usually patent and apparently functioning normally.

Individuals in the group had adapted rather well to speech difficulties, Law and Fulton declared. Patients with all types of clefts consistently omitted "k" and "g" sounds. Those with unrepaired complete clefts from the lip through the soft palate had near normal voice quality while those with a cleft of the soft palate only were most nasal. Speech of patients with untreated clefts involving the hard and soft palates seemed superior to the speech of patients with surgical closure of this type of cleft.

Study patients required more special assistance with hearing problems than normal individuals but less than surgically treated cases. Although social and emotional problems continue to plague these people, they reported that as children at home they were favored over their

siblings and were protected by their teachers at school. The majority had had considerable difficulty at school, Law and Fulton concluded.

Asian Dental Differences Explained by Fluoride

The differences in decayed, missing, or filled (DMF) rates in three Southeast Asian groups apparently can be explained by the differences in fluoride concentrations in the enamel of their teeth. This epidemiological study of Chinese, Malaysians, and Indians and Pakistanis, all of whom were Singapore national servicemen, was reported by Dr. F. McCombie, director, division of preventive dentistry, Health Branch, Government of British Columbia, Victoria.

Eleven dentists, McCombie said, examined 196 Chinese, 180 Malaysians, and 73 Indians and Pakistanis with a mean age of 21.4 years. The Chinese demonstrated a DMF rate of 13.3, the Malaysians 8.4, and the Indians and Pakistanis 8.9.

In attempting to explain the difference between the Chinese and the others, McCombie investigated the extent to which each group practiced oral hygiene and chewed Betel nuts, and also observed periodontal disease status and the attrition to their teeth. Although significant differences were found among the groups with respect to these factors, none of the findings explained the higher DMF rate of the Chinese.

In a concurrent study of the mean fluoride content of enamel in teeth of representatives of the three groups in Singapore, McCombie found that the mean fluoride content in enamel in Chinese (average age 20.7 years) was 20.1 ppm, whereas in Indians, Pakistanis, and Malaysians (average age 22.6 years) the mean was 135.8 ppm.

The differences, McCombie observed, between the average fluoride concentrations in the enamel are considered as most likely reflecting the major cause of the differences

between the DMF rates for these groups, the major cause likely being an increased fluoride concentration in the outer enamel.

Since the water supply on the island of Singapore had a fluoride content of less than 0.2 ppm prior to controlled fluoridation which began in 1956, foods are currently being studied for fluoride content to explain the differences among the groups studied, McCombie said.

Grants-in-Aid Boost Welfare Dental Care

In a broad scanning of developments in State welfare dental services, Azile H. Aaron, regional representative in San Francisco, Bureau of Public Assistance, Social Security Administration, described the nationwide lack of adequate dental care for children in State agencies before 1956. That year the Social Security Act was amended to give separate and added matching funds for medical care.

She commended the prepaid dental contract for statewide welfare services pioneered in the State of Washington in June 1958, in which roughly 22,000 persons, or 20 percent of those eligible, are served yearly. Although the plan does not give complete dental care, Aaron reported that it is providing statistics useful for further legislation.

The dental care project in California was described as the largest and, for children, the widest in scope. Most of the \$2¼ million earmarked in State funds and matched by Federal money is for complete dental care of the 77,000 children, ages 7 through 12 years, in the aid to needy children program. So far, 21 percent of the eligibles, or 1,500 each month, have been treated, with average cost of about \$76. Other recipients receive care only for acute or emergent conditions.

Emphasizing that public assistance aims at providing a minimum living standard for those who, for reasons beyond their control, cannot

progress goes on in the other countries.

Fish catches are swelled by mechanization of fishing craft and by introduction of new types of nets. But in many countries, even where the population needs protein foods, there may be little demand for fish, and FAO has given help with this problem in Chile, Yugoslavia, and Mexico. Handling and transport facilities of the country often are such that fish cannot be shipped inland without spoiling.

Kwashiorkor is a serious syndrome occurring in infants and young children whose diet after weaning does not contain enough protein. Since 1950, FAO, WHO, and UNICEF have been cooperating in a campaign against the disease. The three organizations also cooperate in setting up short training courses for nutrition personnel in member countries. FAO fellowships are awarded for study abroad.

Old Soldiers Never Diet

According to the Army basic standard, the minimum nutrient intake of the physically active soldier in areas of temperate climate should be 3,600 calories, while for troops engaged in outdoor activities where the prevailing temperature is sub-zero, the minimum should be 4,400 calories.

Dr. Theodore E. Friedemann, Dr. Herman F. Kraybill, and C. Frank Consolazio, U.S. Army Medical Research and Nutrition Laboratory, Fitzsimons Army Hospital, Denver, Colo., described the Army dietary.

The feeding of U.S. Army personnel is planned in accordance with minimal dietary standards based on the recommended allowances of the National Research Council and modified by special requirements of troops under operational conditions, they reported.

Since 1941 the procurement and serving of food to Army personnel has been prescribed in a master

menu, published 6 months in advance and used Army-wide. The menu is planned to yield the basic standard nutrients after making a 15 percent allowance for edible waste. During 1957 the average total nutrients provided by the master menu were 4,195 calories, 131 gm. protein, 199 gm. fat, and 470 gm. carbohydrate. The vitamins and minerals in the menu are well above the levels recommended by the National Research Council.

In surveys conducted in four basic training camps, the average of nutrients the soldier consumed in the mess, at the post exchange, and from other sources was 4,265 calories, 131

gm. protein, 201 gm. fat, and 484 gm. carbohydrate. These results agree rather closely with the total edible nutrients provided by the master menu.

A review of military nutrition since colonial days shows that rations have undergone their most rapid changes since 1890, the authors stated. The main reasons for this, they said, have been acceptance of scientific advances in nutrition, altered conditions of warfare, growth of national and individual wealth, expanding production of certain foods, improved storage methods, and extension of transportation and distribution facilities.

School Health . . .

Some Facts of Life Not Widely Known

That the public is not adequately informed about human reproduction was concluded from a survey of high school and college students and adults in a wide range of socioeconomic groups.

Dr. H. Frederick Kilander, professor of education at New York University, who reported the findings, cited the response pattern for the question, "Can a prospective mother make her child more musical if she listens to good music?" Correct answers ranged from a low of 20 percent for a junior high school class to 80 percent for a group of teachers.

The two tests given were part of a larger study, begun in 1935. The Kilander health knowledge test, with 100 multiple-choice items including 10 on sex education, was given to 200 groups of high school and college students and adults. And the information test on human reproduction, consisting of 33 multiple-choice questions, all on human reproduction, was administered to 15 college and adult groups.

Kilander said that about half of the high school students, 3 out of 4 of the college students, and 8 out of 10 of the adults knew that the premarital blood test required in many States was for detecting syphilis, rather than gonorrhea, tuberculosis, or hemophilia.

On the whole, there has been a slight but continuous rise in the level of information during the past 25 years, with college students tending to improve more than high school students during the period.

Adult groups without education beyond high school or without college biological or health instruction tend to score below today's college freshmen, Kilander said. Young parents with high school and college education are better informed in sex education, have a more wholesome attitude toward the subject, and are more successful in presenting it to their children than their counterparts were a generation ago.

The tests also brought out that male high school and college students tend to be slightly better informed on questions about the female sex than the female students are about males. Male students also tend to know more about the anat-

commodities can justify capital investment for sterilization by radiation.

From present accomplishments, Clifcorn concluded, it appears that the treatment of food by radiation will be used first in combination with other types of treatment, complementing rather than replacing the present conventional processes such as canning, refrigeration, dehydration, and antibiotics.

Advises Caution In Diet Appraisal

The recommended dietary allowances of the National Research Council, which were first presented at the National Nutrition Conference in 1941, are a valuable tool in making dietary studies and in food planning, said Dr. Esther F. Phipard, Household Economics Research Division, Agricultural Research Service, U.S. Department of Agriculture.

In studies of the diets of individuals, use of the recommended dietary allowances as a point of reference in analysis and interpretation provides a basis for qualitative evaluation of the individual's diet, and also facilitates comparison of diets of persons with different nutritional needs. Furthermore, averages per nutrition unit for different families or even for different population groups are directly comparable, provided the same dietary allowances and scale of relatives were used in their derivation.

The words used to describe or interpret dietary evaluations are extremely important, she said. To state that the nutrients provided by a diet meet, exceed, or fall short of the recommended dietary allowances or some proportion of them, she observed, is a factual statement based on calculations in which the allowance was used as a point of reference. On the other hand, description of diets as adequate or inadequate requires careful qualification. She deplored the fact that the rec-

ommended allowances have sometimes been treated as if they were precise, almost magic figures, as if to imply that any diet supplying less than the levels recommended in them indicates malnutrition. Such implications she said, have been seized upon eagerly by promoters of certain food supplements and other dietary nostrums.

Another use of the dietary allowances mentioned is in developing weighted per capita allowances to be used as a guide in planning food supplies for a country or any large population group, or for comparison with estimates of the nutrients available from the per capita food supply.

Caution is needed, Phipard advised, in drawing conclusions from these comparisons. Nutrient levels recommended in the dietary allowances refer to amounts to be ingested, whereas the nutrients calculated to be in diets or in food supplies may include quantities lost or discarded in distribution or in preparation for eating. Thus, the two sets of data may not be directly comparable.

Intelligent use of the recommended dietary allowances necessitates study of the text which accompanies them in order to understand how they were developed and what they stand for, she emphasized. They are designed for the maintenance of good nutrition in healthy persons, and they are subject to change from time to time as nutritional knowledge advances.

Says Hungry Nations Must Grow Food

Underfed nations must grow more of their own food, asserted Jean W. McNaughton, regional nutrition officer, Food and Agricultural Organization of the United Nations.

However well they are taught the principles of nutrition, McNaughton said, people cannot feed themselves properly unless the essential nutrients are available at a price they can afford. The nutritionist and the

agricultural economist must work together in long-term agricultural programs to cope with malnutrition, she said.

The task of the Food and Agricultural Organization is to raise levels of nutrition and to help improve the production and distribution of food and agricultural products in member countries. Following are some of the FAO accomplishments described by McNaughton.

Lack of accurate, up-to-date information in every branch of agriculture and nutrition is one of the most serious handicaps to planning. FAO is helping set up or improve agricultural statistical services. It also supplies experts to train personnel of the country in dietary survey work. FAO committees on calorie and protein requirements have made recommendations which have been adopted by many countries.

Systems of land tenure, which affect some of the agriculturally advanced countries as well as those less fully developed, are frequently at the root of the food shortage. FAO has sponsored three regional centers for the exchange of ideas and experience about land use. The first center was in Brazil in 1953 for countries of Latin America, the second in Bangkok for the Far East, and the third in Iraq, attended by 12 Near East countries.

Improved types of seeds and livestock have been introduced into member countries. On the other hand, control of animal diseases is slow work. Owners of livestock have to be persuaded that diseases can be controlled. An example is the experience with rinderpest, for many years the greatest killer disease of livestock in Africa and Asia. The earliest FAO campaigns against it were in Ethiopia, Thailand, and Afghanistan. At first farmers hid themselves and their cattle when the vaccinators appeared. Not until vaccinations began to produce demonstrable results were the farmers converted. Now Afghanistan has been almost cleared of rinderpest and

minimum requirement and that more frequent reviews are preferable.

In 38 percent of the communities replying, review teams held personal interviews with the child and his family; 35 percent of communities did not provide such teams; and 27 percent did not answer the question. While recognizing differences of opinion as to the value of personal interviews, Starr and Wallace stated that considerable inappropriate educational placement occurs unless the child is seen by the reviewers.

In the 98 cities, such community facilities as a crippled children's clinic were rarely used in evaluating handicapped children. When well-developed evaluation and diagnostic services exist, it would be easier for the school system to use them than to attempt to duplicate them, the authors stated.

Orinda Study Favors Clinical Eye Test

The modified clinical technique was found superior to other methods of visual screening in cost and efficiency, during the longitudinal Orinda study which tested the vision of 1,000 elementary school children in California during 1954 through 1956.

The study, partly supported by U.S. Children's Bureau funds, was reported by Dr. Henrik L. Blum, health officer of Contra Costa County, Calif.; Dr. Henry B. Peters, associate clinical professor of optometry, and Dr. Frank Johnson, clinical instructor of optometry, University of California School of Optometry; and Dr. Jerome W. Bettman, professor of surgery (ophthalmology), and Dr. Victor Fellows, Jr., clinical instructor of surgery (ophthalmology), Stanford University Medical School.

During the study period, they observed, the proportion of children found to have visual defects rose about 1.6 percent per year with age. Children with such problems in age groups 5, 6, and 7 years amounted

to 18 percent, increasing to 31 percent in age groups 13, 14, and 15. Also noted was a large shift toward more myopia by those already myopic and a trend toward myopia among some normal children. Only one-seventh of those referred to physicians had uncorrectable defects.

Blum and associates stressed harmonizing opinions and consolidating standards of local physicians for successful visual screening.

Outstanding recommendations were:

- The screening program in the community's elementary schools should be developed by a steering committee of public health and school representatives, ophthalmologists, optometrists, and parents.

- The modified clinical technique should be given all first-grade children and new entrants by a qualified professional examiner. Those passing should have annual Snellen tests.

- School health education should include formal work in visual health, designed also for parents' interest.

They described the county health department, which gives consulting services to schools and has faculty members of participating universities, as a coordinator and promoter of the research.

School Health System Studied in Brookline

A study of the school health program in Brookline, Mass., which in 1955 shifted control of services from the school system exclusively to direction jointly with the health department, was reported by Dr. Marjorie A. C. Young, coordinator of the study, and Dr. Leon J. Taubenhau, director of public health.

One objective was to define and describe the functions of employees in the school health program. Initially, baseline data on school health policies and practices were gathered by Dr. Young through interviews

and from records in the school system and health department. From these data, profiles of each of the eight elementary schools and of the whole system will be formed for comparison. Each profile will cover services, environment, instruction, and administration.

Interview questions were carefully designed, pretested, and revised to describe actual policies and practices without judgmental or value connotations. About 1 week was spent in each school. Persons interviewed numbered 121 out of a total of 335. They included all principals, school nurses, and chief custodians, as well as a 30 percent stratified random sample of all other full-time school personnel. Initial tabulation of the data have been completed, they said.

Among the side benefits from the study mentioned by Young and Taubenhau, was the growing interchange of aid and ideas between school authorities and the health staff, reaching out into other community fields, such as the glaucoma screening program.

Sometime after 1960, they concluded, the interviews will be repeated to determine the extent and direction of change.

Many Reading Failures Of Nonvisual Origin

After examining more than 700 intelligent children with reading disability, Dr. George E. Park of the department of ophthalmology, Northwestern University, reported that only 19 percent needed spectacles.

The complex factors of the disability in mentally unimpaired children called dyslexia, are physical, psychological, social, and educational. In Park's opinion, the handicaps can be corrected in approximately 85 percent of the cases.

About four times as many boys have reading failure as girls, he said, speculating that this condition may express blocked sublimation of aggressiveness, notably stronger in boys.

omy and physiology of their own sex than females about theirs.

Kilander asserted that facts of human reproduction should be integrated into education for family living and into sex education to prepare for marriage and parenthood and to combat socially undesirable behavior.

School Services Needed By Handicapped Children

School systems should provide more educational services for some types of handicapped children and should make more use of medical specialists and health department and community facilities to evaluate these children, suggested Dr. Helen M. Wallace, University of Minnesota School of Public Health, and Dr. Helen M. Starr, Minneapolis Board of Education.

From the replies to questionnaires concerning the educational services available to handicapped children in 98 of the 106 cities of more than 100,000 population, the authors found that all 98 school systems provide for children with orthopedic, neuromuscular, or neurological conditions and for mentally retarded children. Ninety-six percent of the school systems provide for children with speech difficulty, 95 percent for the hard of hearing, 94 percent for the partially sighted, and 91 percent for children with rheumatic fever or heart disease. However, children with epilepsy or cleft palate and those who are emotionally disturbed, deaf, or blind, are less frequently provided for.

Wallace and Starr felt that the policy of admitting children under 5 years of age to public schools, which may benefit certain types of handicapped children, should be extended to the deaf, blind, hard of hearing, partially sighted, and certain groups of those with orthopedic, neuromuscular, or neurological conditions. Less than half the the systems responding admitted younger children with these handicaps.

The questionnaires revealed that admission criteria for retarded children varied considerably, with required I.Q. levels ranging from 20 to 50-75. Other factors, such as social adjustment, should also be taken into consideration.

Placement

The number of children in each of the various types of educational placement reported by the responding school systems is shown in the table. Schooling in hospitals and convalescent homes is confined mostly to the orthopedic group, and home instruction, to the orthopedic, rheumatic fever, and cardiac disease groups. Residential schools are used primarily for the orthopedic, deaf, and emotionally disturbed groups of children.

Ideally, according to the authors, all public school systems in the larger urban areas would provide for all types of handicapped children in regular class and special day class. Home instruction, special day school, and instruction in hospitals and convalescent homes would be reserved for certain children for relatively brief periods.

Admission and Review

Most of the communities reported having criteria for the admission of handicapped children to the public

school systems. However, members of the various professional disciplines participated in establishing criteria in only 18 communities, and medical personnel were participants in only 7 communities. The authors suggested the participation of members of the health and welfare departments, vocational counselors, and social workers in setting criteria.

Wallace and Starr felt the health department should also participate in the review of applications for educational placement. In half the school systems, applications were reviewed only by the board of education, never by the health department alone, and only in one-fifth of the systems was review a joint function of the education and health departments.

A team reviewed applications in most communities; its members most frequently were a psychologist and a school administrator. The authors advocated greater use of nurses, teachers, school counselors, vocational counselors, and medical specialists such as cardiologists, pediatricians, ophthalmologists, otologists, and orthopedists.

The authors also saw a need for periodic review of placement and review prior to withdrawal from placement. They held that a yearly review of each handicapped child regardless of type of placement is a

Handicapped children in various types of placement in 98 cities

Handicap	Regular class	Special day class	Special day school	Special residential school	Home instruction	Hospital and convalescent homes
Orthopedic.....	3, 807	2, 330	4, 608	361	3, 774	3, 557
Rheumatic fever, heart disease.....	4, 065	484	593	67	755	210
Epilepsy.....	1, 373	153	103	0	117	0
Hard of hearing.....	2, 717	2, 021	355	14	2	0
Deaf.....	151	1, 478	1, 919	152	0	0
Partially sighted.....	674	3, 534	412	18	5	10
Blind.....	63	907	215	25	17	0
Cleft palate.....	554	115	9	0	0	0
Mentally retarded.....	11, 071	69, 017	5, 539	22	0	0
Speech.....	116, 880	38, 132	2, 373	7	0	0
Emotionally disturbed.....	1, 229	3, 528	3, 932	2, 407	125	10

interests, and maintenance of consistent behavior standards.

Recommendations

Among the conference recommendations were:

- Preparation of a State curriculum guide for health education at all school grades.
- Availability of health consultants on the district level to assist in improving health instruction.
- A careful, periodic reexamination of health instruction programs for teachers, especially regarding effective use of contributions from the several disciplines and from State, county, and community health agencies. The same holds for school agendas in health.
- Setting up organized methods

for the constant, smooth absorption of new information and materials in school and teacher education programs.

- Careful planning of inservice education of teachers, so that they grow after teaching begins, under the leadership of principals and superintendents.

- A meeting, at least once a year, of representatives from teacher training colleges, the schools, and State health and education agencies, to consider teacher preparation for health instruction.

Finally, the need for health instruction courses for college faculty members was underscored, Vavra reported, remarking that the University of Washington is working toward a master's degree in health education.

respect, but it will help to decide the treatment for the disease, he said.

Study Death Certificates For Accident Data

Local health departments may analyze death certificates for clues to accident prevention, asserted Albert P. Iskran, chief of operational research, Accident Prevention Program, Public Health Service.

While he did not propose restricting epidemiological investigations of accidents solely to fatal accidents, he noted that approximately 100,000 deaths are caused by accidents each year and the data are available for analysis.

Study of death certificates reveals information about the age, sex, race, marital status, and physical condition of the accident victims, the agent causing the accident, and the environmental factors associated with fatalities. Epidemiological investigations need not be limited to these data but can be carried into many facets of the host, agent, environment, and their interaction, Iskran stated.

Describes Characteristics Of Childhood Accidents

Accidents, as the leading cause of death among children, have not risen to the top of the list but rather have been uncovered, stated Dr. James L. Goddard, chief, Accident Prevention Program, Public Health Service.

He pointed out that in the last 55 years mortality due to contagious diseases dropped so phenomenally that improvement in accident fatality rates is scarcely noticeable. However, some 17 million children sustain accidental injuries in the United States each year, according to estimates based on the first 6 months of the National Health Survey, Goddard added.

He drew a profile of accidents

Safety . . .

Local Sources Can Supply Accident Statistics

Existing indicators of local accident morbidity and mortality should be examined before a health department undertakes door-to-door studies, declared Dr. Charles M. Cameron, Jr., associate professor, School of Public Health, University of North Carolina, and safety consultant, North Carolina State Board of Health.

He questioned whether elaborate house-to-house surveys to obtain data on a community are necessary, especially in view of the health departments' shortages of funds and personnel and the difficulties of obtaining reliable, comprehensive information.

Cameron listed some sources of data in many communities. Within the health department, much useful information may be gleaned from death certificates, crippled children's clinics, school health programs, housing inspection records, and

records compiled by nurses, sanitarians, and other staff members who routinely visit homes.

Other local sources of useful data include hospitals, fire departments, emergency squads, schools, industries, health insurance organizations, agricultural extension programs, and safety councils, agencies which have an interest in home or farm safety. Often, with some slight modification in record processing or tabulation, such data can contribute to the health department's accident statistics.

After describing some techniques developed in surveying accident morbidity, Cameron pointed out that these fact-finding activities require specialized skills and personnel not always found within the local health department.

For the average health department seeking to make a community diagnosis of home and farm accidents, tapping local resources should be the first step. The resulting statistical and epidemiological information may not be complete in every

Among medical factors, Park mentioned the importance of the thyroid gland in mental functioning in children. Twenty-seven percent of those in the study had hypothyroidism and 4 percent hyperthyroidism to a degree that therapy was indicated. Reflexes in 15 percent were decreased and 11 percent were exaggerated. Choreic symptoms were present in 6 percent.

Although half the children had borderline or mildly abnormal electroencephalogram records, none were severely abnormal. He cautioned that care must be used in interpreting these data, since such records occasionally obtain for normal children. Bone maturation studies showed 8 percent were retarded in growth for their age. Correlating blood counts of 200 of the children revealed a 27 percent neutropenia, said Park.

Stressing the link between hearing and language function, he remarked that 14 percent of the patients had had abscessed ears. Also, 9 percent had learned to talk late.

Enuresis, with an 18 percent incidence among the children, usually is coincident with other symptoms of personality disturbance that almost always occur in dyslexic children. Even with enuresis and other disturbances present, causes of reading failure may not be pinpointed alone in conditions causing emotional stress.

Though occasionally dyslexia occurs in successive generations, Park believes that the characteristic is imposed usually by experience and very rarely by genetic factors.

Eye Defects Screened Before School Age

Neglect of preschool children with eye defects was criticized by Florence Cunningham, nurse consultant of the National Society for the Prevention of Blindness, New York City. Such neglect is especially serious for children with amblyopia, she said, because full correction may hinge on

the start of treatment before age 6.

Following a detailed description of screening criteria and methods, Cunningham cited results of three mass screening projects in which the groups sent to physicians for eye care were, respectively, 85, 88, and 100 percent correct referrals.

Regarding current disbelief in the successful screening of children so young, she pointed out that a project in Schenectady, N.Y., has screened 60 percent of children in the 3 to 3½ year group, 74 percent from 3½ to 4, and 96 percent of 4-year-olds.

In different communities screening has started with the children of those attending adult education classes, at well-child conferences, in housing projects, and by letters to parents through the schools. The average referral rate for all children screened has been between 5 and 6 percent.

Public Schools Can Help Pupils With Eye Defects

Barely 11 percent of the estimated 78,000 partially seeing children in our public schools were receiving special help in late 1957. This was brought out by Dorothy Bryan, assistant director of special education of the blind and partially seeing, Illinois Department of Public Instruction, in a discussion of current approaches to teaching such children.

Rather than segregate such pupils in special schools or classes, she would enroll them in regular grades in public schools and provide special teaching only for activities needing close, intensive vision. Sometimes such aid is provided by an itinerant specialist.

In Bryan's opinion, the child can thus establish his school social status and, if his vision improves, return full time to regular classes.

Some States, such as Illinois, she said, offer guidance to teachers in schools unequipped for special services, dealing with each case individually. Large-type books and

reimbursement for reader service are given.

She pointed out that these services had secondary value in providing a healthful school environment, such as proper lighting, well-printed books, and correctly designed seats.

Teacher Health Education Scanned in Washington

Schools must instill in today's children firm knowledge and interest in personal and community health, if rapid advances in medicine in the future are to be translated into good health practice.

This theme of a conference on preparing teachers for health instruction, held in Seattle, Wash., during March 1958, was reported by Catherine Vavra, health educator and lecturer with the University of Washington in Seattle. Most of the 47 participants were engaged in teacher education and represented 14 State and private colleges and universities in Washington.

Results of a questionnaire, Vavra said, showed that 13 of the responding 14 institutions offer prospective teachers a course in personal health, and 11, an added course in health instruction. Only 4 of these teacher education institutions require a school health course, although another 7 offer such a course as an elective. Only two have a faculty-student health council.

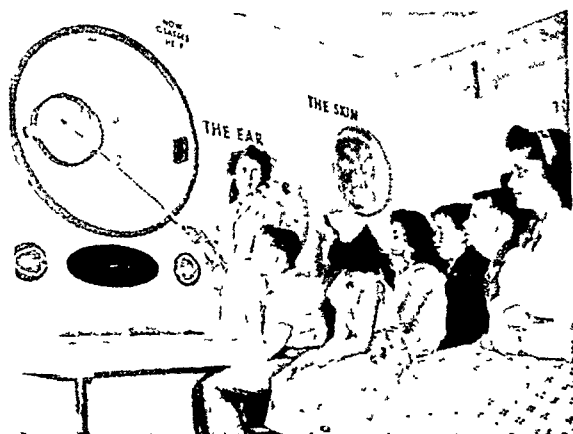
The School's Role

Conferees agreed that health and safety instruction in the school is not an end in itself but rather a bridge to a full life. This teaching must have a safe school environment and a program which helps the child shoulder responsibility for his own health and safety.

Included in the definition of a sound school environment, said Vavra, was a rich social-emotional atmosphere, with the teacher's awareness of individual differences and personality adjustments among the children, enthusiasm for their

Hinsdale Health Museum

*an Illinois community
takes a dynamic approach
to health education*



(David Lannes photo)

A biology teacher on the museum staff explains to young visitors the exhibit showing normal and abnormal eyesight and correction of faulty vision. The museum usually conducts at least two such classes daily.

Dedicated to the promotion of better living through health education, 13 exhibits on the human body formed the opening show of the health museum in Hinsdale, Ill., in May 1958. The museum is housed in a wing of the Hinsdale Medical Center, founded by the Kettering Family Foundation of Chicago. About 34,000 persons visited the museum during the first 6 months.

Pushbuttons, telephones, flashing lights, and moving parts encourage visitor participation. Most of the exhibits focus on a single component of the body, such as the brain, the ear, and the eye.

among those under 15 years of age. Thirty percent of the nonfatal accidents and 15 percent of the fatal accidents occur in this age group. Motor vehicle accidents cause 30 percent of these fatalities, drowning 13 percent. Boys have twice as many accidents as girls.

Accidents occur predominantly in the house, reach a seasonal peak in July and August and a low in February and March, and injuries are most frequently lacerations and head injuries. Burns and scalds are an appreciable proportion of all primary injuries only among those under 1 year of age.

Goddard cited the 200 poison control centers set up in the United States during the last 5 years as an example of current efforts to reduce childhood accident hazards.

Hospital Data on Injured Spur Preventive Measures

Selected data on 15,272 patients treated for trauma in 15 municipal general hospitals during 6 alternate months of 1957 were reviewed by Dr. Marta Fraenkel, medical program evaluation officer, New York City Department of Hospitals.

Indicating the clinical seriousness of their injuries, Fraenkel stated that 656 patients died in the hospital; of these, 224 died within 48 hours after admission. Nearly 6,000 patients required hospitalization of more than a week; 1,700 of these stayed more than a month.

The data, extracted from medical charts of the traumatic patients, were processed centrally as part of

a project called the hospital morbidity reporting system. Such data, Fraenkel said, provide substantial information on the incidence of various injuries among people of given age and sex as well as on the amount of hospital care needed. She stressed the desirability of including information on the external cause of injury, which at present is not specifically recorded.

Trauma due to accidents, poisoning, or violence was the leading nonobstetrical cause for hospitalization. Traumatic patients, representing nearly 13 percent of all discharges and 16 percent of all nonobstetrical discharges, received a total of 239,000 days of inpatient care during the 6 months of the study.

More than 62 percent, 9,516, of the traumatic patients were male. Approximately 44 percent of the total and 55 percent of the nonobstetrical hospital patients were male. Of the traumatic patients under 15 years of age, two-thirds were boys. The excess of male patients did not subside until age 65.

Fractures were the leading type of injury; there were 5,506 fracture patients, an average of 30 admissions per day. Other numerically significant injuries were brain concussions, open wounds and lacerations, and poisonings. Least significant numerically were "superficial," head, and internal injuries, dislocations, and burns.

Variations by Age

Of 3,275 traumatic patients under 15 years of age, 39 percent were under 5 years; 34 percent, 5-9 years; and 27 percent, 10-14 years. This

group comprised 20 percent of all children admitted. In the 5-9 age bracket, injuries accounted for nearly 28 percent of all admissions; a third of the boys admitted in this age group were traumatic.

Among children, the most significant injuries were brain concussions, fractures of the extremities, open wounds and lacerations, superficial injuries, and poisonings. Noteworthy for their relative prevalence among children, Fraenkel remarked, were foreign bodies in the digestive tract, aspirin poisoning, and lead poisoning.

High incidence of injuries among children has prompted a study to analyze the relationship between external cause and nature of the injuries.

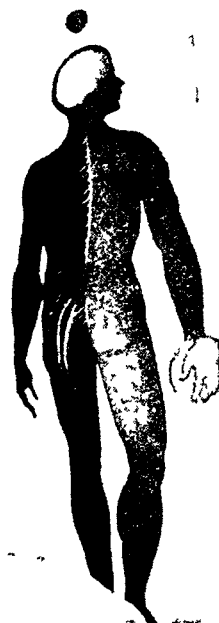
Nearly 15 percent, 2,262, of all traumatic patients were 65 or over. Fractures, almost half of which were of the femur, accounted for 60 percent of all traumatic conditions in this age group, against 32 percent of patients under 65 years.

More than 100 aged patients are admitted monthly to the municipal general hospitals for hip fractures. This figure is particularly significant, Fraenkel pointed out, because of the length of hospital care required by such patients and because of the protracted, or even permanent, physical impairment that may result. Some conditions, she said, which are frequent among young people are of relatively little significance among the aged; for example, among those 65 or over, there were only 36 admissions for burns and only 18 for foreign bodies in the digestive tract.

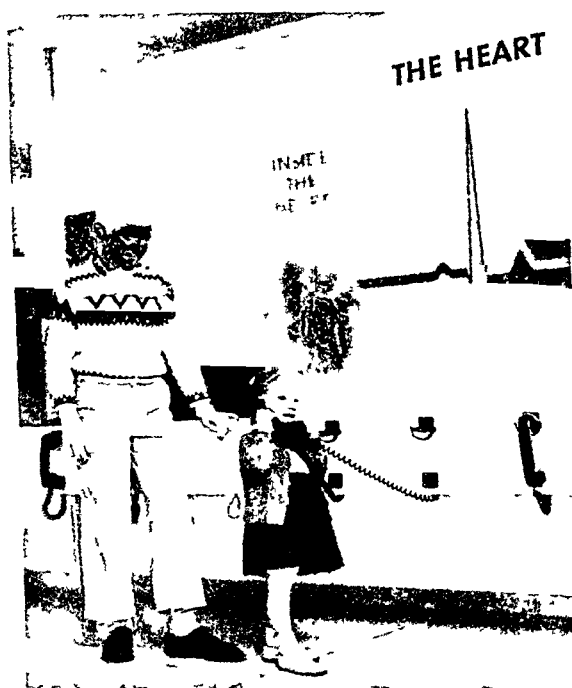
Engineers to Discuss Air Pollution

The continuing challenge of air pollution is the theme of a meeting of the American Society of Mechanical Engineers, Pittsburgh Section, at the Penn-Sheraton Hotel, April 20-21, 1959. All public health workers are invited, to share in Pittsburgh's bicentennial celebration.

Students operate the control on a giant brain, especially constructed for Hinsdale. The unit presents what is known about the nature of nervous energy and thought processes.



(Chicago Tribune photo)



(Stephen Heiser photo)

The comprehensive heart display shows both inside and outside of the organ, circulation, heartbeat, and an electrocardiogram.

Other displays describe the body's structural systems, birth, and the coughing process. A transparent female figure, life size, in Plexiglas, contains organs and systems in distinctive colors, which are lighted as a voice on a synchronized sound track explains their functions. (A similar exhibit, pictured in *Public Health Reports*, March 1958, is installed in the Smithsonian Institution.)

The center's museum, health theater equipped with a film collection, and medical library are free to the public; they are maintained by the proceeds from rentals on medical center offices.

The museum schedule calls for close collaboration with schools in the area and with the physicians in the medical center.



(Rus Arnold photo)

"You began as a single cell . . ." says the voice recounting the engrossing story of body cells. Designed especially for Hinsdale, the exhibit forms the museum's central motif.

Part of the exhibit on the structural systems is a skeleton that moves (right). A neighboring model is a male figure with muscles exposed.



(Rus Arnold photo)



HEARING AND BALANCE



(Rus Arnold photo)

The phenomenon of hearing is demonstrated by means of a human "telephone receiver."

A favorable milieu for the growth of staphylococcal enterotoxins in codfish may be created by extensive handling, use of certain salt concentrations, and long immersion in tapwater before cooking.

Two Poisoning Outbreaks in Puerto Rico From Salt Preserved Codfish

ALFONSE T. MASI, M.D., RAFAEL A. TIMOTHEE, M.D., M.S.P.H., ROLANDO ARMIGO, M.D., M.P.H.,
DARWIN ALONSO, Ph.D., and LUIS E. MAINARDI, M.D.

IN THE FALL of 1957 Puerto Rican health authorities investigated a mass outbreak of food poisoning at the Ponce District Hospital and another at the institution for juvenile delinquents of San Juan. Both events were presumably caused by staphylococcal enterotoxins involving a common vehicle—salt-preserved codfish (Atlantic). The food in this form had not previously been incriminated in such intoxications.

The incident at the hospital, involving a

reported 303 patients in a total population of 457, occurred following lunch on September 5, 1957. There were no reports of acute gastroenteritis in the community outside the hospital. In the juvenile institution, the outbreak followed lunch on November 27, 1957, affecting 236 inmates out of a total of 320. Both outbreaks were first reported to local public health authorities, who in turn informed the bureau of communicable disease control in the Puerto Rico Department of Health.

Dr. Masi is an epidemiological intelligence officer of the Communicable Disease Center, Public Health Service. Dr. Timothee is chief of the bureau of communicable disease control, Puerto Rico Department of Health, where Dr. Mainardi serves as associate epidemiologist. Dr. Armijo is associate professor of epidemiology, and Dr. Alonso, assistant professor of bacteriology in the University of Puerto Rico.

Dr. Milton J. Foter of the Robert A. Taft Sanitary Engineering Center provided technical assistance, and Dolores Lugo Danielsen and Dr. Elaine Updyke of the Communicable Disease Center contributed to laboratory phases of the study. The paper was presented in essentially the same form before the Epidemic Intelligence Service Conference at the Communicable Disease Center in Atlanta, Ga., May 16, 1958.

Ponce District Hospital Outbreak

Between the lunch at the Ponce District Hospital and the onset of illness, the mean duration of time was $3\frac{1}{4}$ hours, with a range of 1 to 15 hours. The onset was sudden, with vomiting, headache, and abdominal pain but no significant temperature change. The majority had diarrhea, and several noted mucus in the discharge.

The mean duration of illness was $6\frac{1}{4}$ hours, with a range of 2 to 24 hours. An associated fatality occurred in a chronically ill 53-year-old woman with long-standing pemphigus vulgaris, in whom postmortem examination revealed changes of the intestine compatible with acute inflammation.

The menu for the suspected lunch consisted

Signs

and

Symptoms

of trends in public health

Pedestrian deaths in New York City since August 8, when the anti-jaywalking ordinance went into effect, are 22 percent less than for the same period in 1957; injuries are 14 percent less.

" "

The "bedside central center" at Wesley Memorial Hospital, Chicago, is the first completely integrated system of self-help for patients. Consisting of various switches, the machine enables a patient to draw draperies, turn on lights, raise or lower his bed, and so on. It also contains an intercom system between patient and nurse's station.

" "

Progress in Psittacosis Research and Control, published by Rutgers University Press, includes contributions by Justin M. Andrews, James A. Baker, Albert A. Benedict, Robert H. Russell, Preben Møller Christensen, Donald B. Davis, John P. Delaplane, René J. Dubos, B. Eddie, Raymond Fagan, Irving Gordon, Robert J. Huebner, K. F. Meyer, R. J. Muir, Morris Pollard, J. H. Richardson, John H. Scruggs, N. L. Shipkowitz, Richard E. Shope, James H. Steele, and Morgens Volkert. The editor is F. R. Beaudette.

" "

The summer graduate program in public health statistics at the University of Michigan will be offered again in 1959 and 1960. Designed to train specialists in records maintenance and medical research, the program was developed under a grant from the Public Health Service.

The National Safety Council urges all States to license motor-scooter drivers in order to cut down teenage accidents; it opposes licensing drivers under 16 years old.

" "

Of public health nurses employed in Wyoming State and local health departments, 100 percent have completed an approved program of study in public health nursing.

" "

At the Second International Conference on Peaceful Uses of Atomic Energy, Lewis L. Strauss called for an international convention to protect the public against nuclear reactor accidents. Professor Johan H. de Boer, heading the Netherlands delegation, pressed for an international safety code.

" "

Four years of fluoridated water has reduced the number of cavities in school children by 47 percent and extractions by 43 percent, and has accounted for a saving of \$1 million a year, Philadelphia Health Commissioner James P. Dixon says.

" "

According to Alcoholism and California Related Statistics, 1900-1956, published by the California State Department of Public Health, more alcohol has been consumed per capita in California since 1936 than in any other State. Alcoholism in California in 1955 affected 723 per 100,000 persons 21 years old or older, and it caused 1 percent of all deaths in that year, making it 11th among leading causes of death in the State.

The number of people without ready access to general hospitals has dropped from 10 million to 2.8 million in the last decade, the Public Health Service reports.

" "

Since August 15, the Public Health Service has been studying the effects of the fire ant control program on aquatic life in the southeast. The U. S. Department of Agriculture has treated about 200,000 of the 27 million acres affected. (See *Public Health Reports*, May 1958.)

" "

The National Cancer Institute, Public Health Service, has set up four projects for the development of cytological methods in diagnosing cancer of the lung, large intestine, stomach, and urinary tract. Three schools of medicine have been designated for the first three projects. In order, they are the University of Texas, Ohio State University, and Bowman-Gray in Winston-Salem, N. C. The site of the fourth project has not been determined.

" "

Emphysema tends to develop in obscure pockets of the lungs where everyday soot particles nestle, according to Dr. Charles P. Oderr, chief of radiology, New Orleans Veterans Administration Hospital. After photographing lung tissue specimens through a beryllium window tube, the investigators found 45 percent of 125 persons with evidence of the disease. Most of them had indoor dusty jobs.

" "

The number of orphans in the United States dropped from 6.4 million in 1920 to 2.7 million in 1958, whereas the child population rose from 39 to 60 million in that time, the Health Information Foundation reports.

" "

Federal programs for older people (excluding programs of the Department of Health, Education, and Welfare) are summarized in Issue No. 77 of the Social Legislation Information Service, Washington, D. C.

pyogenes var. *aureus* was readily demonstrated in both specimens in the approximate concentration of 10^6 organisms per gram. This strain was subsequently encountered by the food bacteriology section of the department and has been confirmed as such by the Staphylococcal Unit of the Communicable Disease Center, which undertook phage typing of strains isolated in the outbreaks.

No cultural examination of the kitchen personnel was made for staphylococcal carriers because of the original lack of success in isolating this organism from the food. There was, however, no evidence of superficial purulent lesions or a history of recent upper respiratory infection.

Outbreak at the Juvenile Institution

In the outbreak at the institution for juvenile delinquents, the mean interval between lunch and the onset of illness was slightly less than 2 hours, with a range of several minutes to 8 hours. The symptoms were similar to those of the previous outbreak, and the duration of illness was less than 24 hours in two-thirds of the cases and from 1 to 4 days in the remainder.

The menu consisted of codfish salad, rice and beans, bread pudding, and bread. An analysis of attack rates of illness by food consumed by 223 available inmates (table 3) strongly implicates codfish salad as the responsible item ($P < .0001$). Furthermore, an analysis of attack rates by food combinations reveals an absence of illness in inmates consuming either rice and beans or pudding but abstaining from the salad (table 4).

The preparation of codfish salad at this institution left no doubt as to its potentialities to

Table 4. Rate of attack of acute gastroenteritis among persons eating certain food combinations for lunch at the institution for delinquents, November 27, 1957

Food combinations	Total persons	Number ill	Percent ill
Rice and beans.....	221	177	80.1
With pudding.....	193	158	81.9
Without pudding.....	28	19	67.9
With codfish.....	203	177	87.2
Without codfish.....	18	0	0
Pudding.....	194	159	81.9
Without rice.....	1	1	100.0
With codfish.....	184	159	86.4
Without codfish.....	10	0	0
Codfish.....	205	179	87.3
Without pudding.....	21	20	95.2
Without rice.....	2	2	100.0
Total persons eating..	223	179	80.3

support the production of enterotoxin. Food for the inmates is prepared in a separate kitchen, which is of substandard hygiene and is staffed by the inmates. At 3:00 p.m. in the afternoon, 20 hours before serving, 100 pounds of cod were boiled for 1 hour. Fresh tapwater was added to the caldron and three inmates extracted fish by hand to remove bones. At 5:30 p.m., with one-quarter deboned, the work was abandoned to be completed the following morning. The fish remained at room temperature until 11:30 a.m., when it was served after light seasoning.

No specimens were obtained from patients. The food bacteriology section isolated various strains of *Staphylococcus pyogenes* from the rice and bread pudding but could not demonstrate any such contamination in the salad. However, the school of medicine isolated a coagulase-positive strain of *Staphylococcus*

Table 3. Rate of attack of acute gastroenteritis among persons eating lunch at the institution for delinquents, November 27, 1957

Food item	Persons eating food item			Persons not eating food item		
	Total number	Number ill	Percent ill	Total number	Number ill	Percent ill
Rice and beans.....	221	177	80.1	2	2	100.0
Pudding.....	194	159	81.5	29	20	69.0
Codfish salad.....	205	179	87.3	18	0	0
Bread.....	202	165	81.7	21	14	66.7

of codfish salad, tomatoes, starchy fruits and vegetables (plantains, yams, and sweet potatoes), bread, butter, whole milk, and guava paste. Each item was investigated as to manner of preparation, and an analysis of attack rates of illness was made with the result that all could be reasonably excluded as responsible vehicles with the exception of codfish salad (table 1).

Because of the small number of persons in the originally interviewed group that had abstained from codfish, all inpatients were questioned in an effort to include cardiac and diabetic patients who were served the same menu with the exception of codfish salad and guava paste. Only guava paste was included as a control food to expedite this second survey which covered 196 patients (table 2).

The high attack rate of gastroenteritis (79.2 percent) in patients eating codfish salad without guava paste and the absence of illness in 37 cardiac and diabetic patients who abstained from the salad strongly implicates codfish as the responsible item ($P < .0001$). The only cardiac patient who suffered symptoms admitted eating cod against dietary orders.

The entire hospital population is served from the single kitchen in which sanitation was found to be impeccable. The routine manner of preparing codfish salad was to allow whole fillets to desalt in cold tapwater for 12 hours during the night and to prepare the salad on the morning of serving. However, a significant modification in technique occurred on the morning prior to the outbreak, when the salted fish was

Table 2. Rate of attack of acute gastroenteritis among 196 patients eating certain food combinations for lunch at the Ponce District Hospital, September 5, 1957

Food combinations	Total persons	Number ill	Percent ill
Codfish salad, with guava paste.....	133	120	90.2
No codfish salad or guava paste.....	37	0	0
Codfish salad, no guava paste.....	24	19	79.2
Guava paste, no codfish salad.....	2	0	0

erroneously placed in hot tapwater. The average temperature of the kitchen is 100° F. during the day and 72° F. from 7 p.m. to 7 a.m. On the following morning the cod was prepared as a salad and distributed into thermatically controlled serving cars maintaining a temperature of 165° F. The food remained in these vehicles for 60 to 90 minutes before being consumed by the hospital population.

Five vomitus, two stool, and three blood cultures of severely ill patients revealed no staphylococci or other pathogens. The food bacteriology section of the health department could demonstrate no pathogens in any of the food items after considerable effort. Two frozen samples of cod were referred to the bacteriology department of the University of Puerto Rico Medical School after several weeks, because of the epidemiological implication. There, a coagulase-negative strain of *Staphylococcus*

Table 1. Rate of attack of acute gastroenteritis among persons eating lunch, Ponce District Hospital, September 5, 1957

Food item	Persons eating food item			Persons not eating food item		
	Total number	Number ill	Percent ill	Total number	Number ill	Percent ill
Codfish salad.....	289	254	87.8	5	3	60.0
Tomatoes.....	141	120	85.1	153	137	89.5
Yams.....	282	246	87.2	12	11	91.6
Sweet potatoes.....	287	251	87.4	7	6	85.7
Plantains.....	285	250	87.7	9	7	77.8
Bread.....	205	173	84.4	89	84	94.3
Butter.....	108	92	85.2	186	165	88.7
Whole milk.....	266	230	86.4	28	27	96.4
Guava paste.....	266	232	87.2	28	25	89.3

preserving codfish is pertinent to an understanding of the food's potentialities for contamination with enterotoxigenic staphylococci. The flesh and body cavities of salt water fish are sterile (11), but the surfaces and gut may be contaminated in the order of 10^2 to 10^7 . Dyer has demonstrated that 73 percent of aerobic flora of Atlantic cod may belong to the micrococcus group and that 7 percent of these were *Staphylococcus pyogenes* vars. *aureus* and *albus* (12). However, these organisms appeared to be marine in origin (13) and were not considered potentially pathogenic because of a uniformly negative coagulase reaction (14). When the fish arrives at shore and is handled, the micrococcus flora increases in inverse ratio to the degree of cleanliness of the premises (15). Of the micrococci growing at 98.6° F., 10 to 16 percent were shown to be indistinguishable from coagulase-positive *Staphylococcus pyogenes* var. *aureus*. These micrococci must be considered potentially pathogenic (16).

After filleting, the cod is preserved with salt which appears to be a complex process involving the inactivation of bacterial enzymes besides the withdrawal of moisture, thus restricting microbiological activity (17). Salt is interspersed between layers of split fish, establishing a concentration of about 20 percent in 14 to 16 days while the juices are allowed to run away, with a maximum loss of weight of 30 percent (18). The flesh, at this stage "wet stack" or "green" cured, always contains some microorganisms, almost exclusively micrococci, and never becomes sterile (15). Spoilage at this stage is known as "pinking" because of the characteristic pigment produced by the contaminating flora (19). Food poisoning was observed in association with spoiled and "pink" cod as early as 1886 (20), but the nature of the poisoning has not been clearly defined.

The fish is then hard dried by exposure to wind and sun and is no longer susceptible to such contamination unless stored in relative humidities of 75 percent and greater. Boury (21) has demonstrated, however, that *Staphylococcus pyogenes* var. *aureus* may survive in hard-dried cod fillets and even grow under suitable conditions of humidity.

This report has demonstrated the hazard of exposing salted cod to water at environmental

temperatures for extended periods of time. Although a preformed staphylococcal enterotoxin has not yet been demonstrated in salted cod during its processing or storage, the logical extension of available evidence forces one to consider this a strong possibility. More adequate information, therefore, is needed with regard to the safe hygienic standards in these phases for the protection of the public's health.

The study also illustrates the need for careful analysis of information obtained from field investigations of foodborne outbreaks, inasmuch as definite laboratory confirmation of causative factors often is not obtainable.

Summary and Conclusions

Two food poisoning outbreaks in Puerto Rico during the fall of 1957 were ostensibly caused by staphylococcal enterotoxin in salt-preserved codfish, a product that had not previously been incriminated in such mass intoxications.

The first outbreak, at the Ponce District Hospital, affected 303 persons and the second, 236 inmates of a juvenile delinquents' institution. Laboratory tests on samples of the codfish salad served in the second outbreak yielded strains of *Staphylococcus pyogenes* var. *aureus* when a 10 percent sodium chloride nutrient medium was used.

The findings support the view that partial preservation of codfish by salting does not completely destroy contaminating organisms which have a high salt tolerance. In fact, the addition of suitable concentrations of salt may serve to kill spoilage bacteria which might compete for growth with the staphylococcus.

These food poisoning experiences demonstrated the hazard of consuming salt-preserved codfish following its extended exposure to water at environmental temperature.

Enterotoxin production studies were carried out on cats in the laboratories of the Robert A. Taft Sanitary Engineering Center. When the animals received filtrates from cultures of strains isolated in the outbreaks, they did not give the response which typically follows injection of enterotoxin.

This type of test, however, results in non-specific responses. There is evidence, more-

pyogenes var. *aureus* in the codfish salad with an estimated concentration of 1.6×10^7 organisms per gram. All strains were confirmed by the Staphylococcal Unit of the Communicable Disease Center. The one isolated from the cod and two other coagulase-positive strains from rice and bread pudding proved resistant to the phage types used. Ten of the twelve food handlers were also shown to carry coagulase-positive *Staphylococcus pyogenes* var. *aureus* including six phage-resistant strains.

Enterotoxin Production

Isolated strains of staphylococci from the codfish salad served at the hospital and the institution for juvenile delinquents were referred to the Robert A. Taft Sanitary Engineering Center, Public Health Service, for enterotoxin production experiments.

Heated culture filtrates were tested by intravenous injection into cats. None of the laboratory animals receiving the filtrates prepared from the cultures gave the response which typically follows the injection of enterotoxin.

According to Dr. Foter, who supervised the enterotoxin testing at the Robert A. Taft Sanitary Engineering Center, there is at present no completely satisfactory experimental test for enterotoxin. The most reliable test is the feeding of suspected food to human volunteers, which is obviously impractical as a routine test.

The feeding of laboratory animals with suspected food results in nonspecific responses. In Dr. Foter's opinion, intravenous injection of a heated culture filtrate of staphylococci isolated from food into cats has limited value. The observations indicate that a positive response would be reliable, but the meaning of a negative response is not clearly understood.

Also, there is evidence that the laboratory animals used for this type of test, the monkey and the cat, are less susceptible to enterotoxin than man. An assay which can be performed quickly with simple equipment and with a high degree of reliability is urgently needed.

Discussion

The success of the medical school laboratory in isolating staphylococci from the codfish

salad was attributed to the use of milk with 10 percent sodium chloride agar for plating after making appropriate dilutions. This type of selective medium was not used by the food bacteriology section of the health department. *Staphylococcus pyogenes* has been shown to have a high salt tolerance (1), with enterotoxigenic strains proved capable of initiating growth in a 20 percent sodium chloride broth (2). Nutrient media containing 7.5 to 10 percent sodium chloride, in fact, have previously been demonstrated to be preferable for the isolation of *Staphylococcus pyogenes* from sources highly contaminated with other organisms (3,4).

To date there has been no demonstration that naturally occurring coagulase-negative *Staphylococcus pyogenes* produces enterotoxin (2,5,6), but the strain isolated in the outbreak at the Ponce District Hospital (from 4 different food samples by 2 laboratories) bears a suspicious relation to the etiology, and we believe it merits further study.

The time, temperature, and salt-concentration conditions that prevailed in the preparation of the salad prior to the Ponce hospital outbreak were duplicated in the food bacteriology laboratory. The extended desalting allowed luxuriant growth of staphylococci, but the seasoning and heating process before serving resulted in a marked diminution of these organisms. Therefore, a possibility to be considered is that an enterotoxin may have been produced by a strain of staphylococcus which was destroyed by final heating, and that the coagulase-negative strain appeared as a contaminant. It is unlikely that any of the temperature factors, detrimental as they may have been to these organisms, would have altered a formed toxin (7).

Phage typing of enterotoxin-producing strains of coagulase-positive staphylococci has received attention (8-10). Although it has been found that the great majority of the reported strains belonged to a reasonably easily defined group of phage patterns, approximately 12 percent were phage resistant, as was the case with the strain isolated from the codfish salad implicated in the outbreak at the juvenile delinquents' institution.

A brief review of the dry-salting process of

Serologic Evidence Of *L. australis* A In a Georgia Patient

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THE SEROTYPE *Leptospira australis* A Ballico was first isolated by Cotter and Sawers (1) in 1934 in northern Queensland, Australia. It was reported recently by Derrick and others (2) as the second most common serotype in Australia and accounted for 87 percent of the leptospirosis cases that occurred in cane-field workers. The principal animal carrier was found to be a native rat, *Rattus conatus* (3). In addition, this serotype was isolated from the kidney of a dog in Makasar by Mochtar (4) and from hedgehogs and yellow-throated mice, *Apodemus flavicollis*, in Czechoslovakia by Kmety (5).

No evidence of *L. australis* A infection was found in the United States until 1955, when two cultures isolated from raccoons in Decatur County, Ga. (6), were identified in the Communicable Disease Center's *Leptospira* Research Laboratory (7). Subsequently, presumptive identification has been made of 3 other isolations from raccoons and 1 from an opossum in southwestern Georgia.

In August 1956 a macroscopic slide aggluti-

nation test antigen was prepared from the first *L. australis* A strain isolated in southwestern Georgia. The antigen was incorporated into the battery of leptospiral antigens used to screen all human and animal serums examined in the laboratory. Routine use of this antigen led to the detection of *L. australis* A antibodies in serum from a patient in October 1957. The history of the patient's illness and the subsequent epidemiological investigation are described in this report.

Case History

J. W., a 14-year-old white schoolboy, awoke on October 11, 1957, with generalized malaise. Several hours later he had a headache accompanied by rapid onset of pain in both calves and knees that was aggravated by movement. The muscular pains spread to the thighs, and nausea with vomiting began. Fever was first noted in the evening of the day of onset. The following day, October 12, after 36 hours of clinical illness, he was admitted to Grady Memorial Hospital. On admission, temperature was 104° F. (rectal); pulse, 92; blood pressure, 130/65.

When questioned, the patient revealed that he had been swimming in a creek on a farm near Atlanta 10 days prior to admission. During the 2 weeks prior to onset of illness he had stayed with an aunt who owned a dog and several hogs. Many rats had been seen around the aunt's home and hogpens.

On examination, he appeared acutely ill and moderately lethargic. A generalized skin rash was present, most marked over the trunk, extremities, and face, but there was no eruption on either the palms or soles. Each circumscribed, maculopapular eruption measured 0.5 to 1.0 cm. in diameter and blanched on pressure. The pharynx was diffusely injected without exudate. There was no evidence of conjunctivitis, jaundice, joint tenderness, or swelling. Results of electrocardiogram were within normal limits. The initial white blood count was 8,300 per cc. with 76 percent segmented forms, 4 percent band forms, and 20 percent lymphocytes. The sedimentation rate was 41 mm. per hour. Urinalysis revealed a specific gravity of 1.025, 3 red blood cells per high-power field

Dr. Starr is public health veterinarian, division of epidemiology, Georgia Department of Public Health. Mrs. Galton is chief, and Dr. Menges, a veterinarian, Leptospira Research Laboratory, Epidemiology Branch of the Communicable Disease Center, Public Health Service, Chamblee, Ga. Dr. Ammons is assistant resident at Grady Memorial Hospital, and Dr. LeMaistre is associate professor of medicine, Emory University, both in Atlanta. This paper was presented at the meeting of the Southern Branch of the American Public Health Association on May 8, 1958, at Little Rock, Ark.

over, that both the monkey and the cat are less susceptible to enterotoxin than man. There is urgent need for a simple, fast, but reliable test for enterotoxin.

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Principles of Administration Applied to Nursing Service. By H. A. Goddard. WHO Monograph Series No. 41; 1958; 106 pages; \$4.

Mental Health Aspects of the Peaceful Uses of Atomic Energy. Report of a study group. WHO Technical Report Series No. 151; 1958; 53 pages; 60 cents.

Air Pollution. Fifth report of the Expert Committee on Environmental Sanitation. WHO Technical Report Series No. 157; 1958; 26 pages; 30 cents.

These publications may be obtained in the United States, directly or through a bookseller, from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.

swamp rabbits, and 1 red fox were caught. *Leptospira ballum* was isolated from the kidney and urine of one opossum and its serum agglutinated with *L. ballum* antigen. No leptospire were obtained from kidney and urine cultures of the other animals, and no leptospiral antibodies were detected. It is interesting that *Salmonella give* was isolated from the urine of another opossum and *Salmonella typhimurium* from the kidney of the third opossum.

It was learned that three other boys, ages 14 to 16 years, went swimming with the patient. When questioned, they stated they had not been ill. Serum samples were not obtained from them until approximately 3½ months after the patient's illness and no leptospiral antibodies were detected.

The aunt's dog had died shortly after the patient's illness. A local veterinarian stated that symptoms exhibited by the dog before death did not indicate leptospirosis.

Comment

The clinical symptoms exhibited by the patient and the demonstration of a rise and fall in antibody titer to *Leptospira australis* A Ballico, together with a history of both direct and indirect exposure to animals, suggest a diagnosis of leptospirosis probably caused by a member of the *australis* A serogroup or a related serotype.

While the limited epidemiological studies did not reveal evidence of *L. australis* A infection in animals around the home in which the patient had stayed prior to his illness or in those that had access to the creek, *Leptospira ballum* was isolated from one of the opossums trapped near the creek. Previous studies in Virginia (8),

Louisiana (9), and Georgia (6) have shown that opossums may harbor at least seven leptospiral serotypes including *L. australis* A. Thus, the most likely hypothesis as to the possible source of the boy's infection appears to be the creek which may have been contaminated by infected opossums or other wild animals.

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Air Pollution Control Association Meeting

The annual meeting of the Air Pollution Control Association will be held June 22-26, 1959, at the Hotel Statler, Los Angeles, Calif. The latest equipment for air pollution control will be displayed in the exhibit area, where experts will demonstrate the equipment and answer questions. Copies of papers presented at technical sessions will be incorporated in printed proceedings.

with only an occasional white blood cell. No albumin, sugar, or acetone was detected. Cerebrospinal fluid pressure, protein, and sugar content were within normal limits. There were 12 lymphocytes per high-power field.

Blood was obtained on the second full day of hospitalization (October 14) and cultured in Fletcher's medium for leptospires. The patient was then given injections of 600,000 units of procaine penicillin every 4 hours and of 250 mg. of chloramphenicol every 6 hours. Fever characterized the first 2 days after admission. Rectal temperature ranged up to 105° F. on the first day, but did not go above 100° F. on the second day, and thereafter remained normal. Marked subjective improvement occurred on the morning of the second hospital day. Although the total peripheral white blood count remained within normal limits, progressive lymphocytosis which reached 40 percent was present during the second week of hospitalization. Hepatic function was within normal range, and acute and convalescent serums were negative when tested for agglutination with typhoid, paratyphoid, brucella, and OX-19 antigens.

Skin biopsy of the rash showed a mild perivascular, acute inflammation. Muscle biopsy was unremarkable. The patient was discharged on the 10th hospital day and has remained well.

Serum obtained from the patient the third day after onset of illness was negative when tested by macroscopic slide agglutination with 12 leptospiral antigens, but a second sample collected on the seventh day of illness showed a positive slide test with *L. australis* A antigen. When tested by microscopic agglutination with a battery of 18 live leptospiral antigens, the second serum sample reacted only with *L. australis* A antigen to a titer of 1:200. For serum samples obtained from the patient on the 10th, 12th, 25th, and 42d days after onset of illness, titers of 1:1,600, 1:1,600, 1:400, and 1:400, respectively, were demonstrated against *L. australis* A antigen. (These titers were confirmed by A. D. Alexander, of the Walter Reed Army Institute of Research.) No reaction was obtained with the remaining 17 leptospiral antigens. Serum obtained from the patient 11 months later (September 1958) reacted to a titer of 1:100 with *L. australis* A antigen. No

leptospires were isolated from the blood cultured on the third day of illness.

Epidemiological Investigation

In early November, about a week after the patient was released from the hospital, a visit was made to his home to obtain further information regarding his possible exposure, but no one was at home. About a week later the patient and the aunt with whom he had stayed prior to his illness were found, and arrangements were made to visit the aunt's home and the site where the patient had been swimming. Conditions about the aunt's home were conducive to rat infestation. Although she had used warfarin about 3 weeks earlier, arrangements were made to set traps around the premises. Near the house were several hogpens with eight hogs standing in mud about 6 inches deep. Blood samples were collected from two of the hogs for leptospiral agglutination tests.

The creek where the patient had been swimming, approximately 4 miles from College Park, Ga., ran through a pasture in which cattle were grazing. The swimming "hole" was at the edge of a thickly wooded area. Fox and raccoon tracks were observed on the creek bank. Permission was granted by the owner to obtain blood specimens from the cattle and to set traps for wild animals in the vicinity of the creek. All trapping was done with the assistance and cooperation of the Fulton County Health Department, the U. S. Fish and Wildlife Service, and the Insect and Rodent Control Section of the Communicable Disease Center.

Twelve traps were set in and around the aunt's home and hogpens, but only one young rat (*Rattus norvegicus*) was caught, probably because of the recent use of warfarin. No leptospires were isolated from the kidney and urine of this rat, and no leptospiral antibodies were detected in the serum. Blood specimens from the two hogs were negative also in 12 leptospiral antigens when tested by slide agglutination.

Serum from 2 of the 4 cattle tested showed a weakly positive slide agglutination reaction to *Leptospira pomona* antigen. Traps were set in the vicinity of the creek for 3 nights, 15 to 20 traps each night. A total of 3 opossums, 3

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front of a drive toward eradication of malaria throughout the world. Eradication programs for smallpox, yaws, and urban yellow fever have also been approved by the governing bodies.

"Dr. Horwitz enjoys a distinguished career in public health. He brings to his new position a rich experience in the teaching and practice of public health in his own country, Chile, and in this organization. Dr. Horwitz has the advantage of some years of experience on the staff of the Pan American Sanitary Bureau and in recent years has served as his country's representative on the governing bodies of the organization. With his intimate knowledge of the organization's work, with the whole-hearted support of the member governments extended at the 15th Pan American Sanitary Conference and with the respect and affection which he enjoys among his colleagues on the Bureau's staff, the organization can look forward to a period of increasing fruitful activity under his leadership."—DR. FRED L. SOPER, *director emeritus of the Pan American Sanitary Bureau, Regional Office of the World Health Organization.*

The State of Well-Being

"The concept of health as stated in the opening words of the constitution of the World Health Organization—a state of physical, emotional, and social well-being—is a challenging one. It seems to me that this definition makes

'health' synonymous with 'happiness.' It is only natural that our efforts have been directed mostly toward the promotion of the physical well-being of people. All of us in the public health field recognize the present and continuing priority of the prevention of death and disease, so much of which is completely unnecessary in the light of present-day knowledge.

"I cannot let this occasion pass, however, without calling attention again to the wider concept of health. Obviously, physical well-being contributes to emotional and social well-being; nevertheless, I feel that those of us in the health field must also find methods to promote emotional and social well-being directly.

"To be successful, the malaria eradication programs of today require the active participation of local communities and individuals in local communities. It has been clearly demonstrated that to obtain this participation efficiently the techniques of the behavioral sciences must be used; thus knowledge in the emotional and social fields furthers physical health.

"Perhaps in the field of child health it is easier to illustrate a direct approach to emotional and social well-being. In the practice of pediatrics, in child health clinics and conferences, major emphasis has been on the child's nutrition and his protection against communicable diseases. The trend now, however, is for health workers to widen their scope and to consider the totality of the physical, emotional, and social well-being of the child. Disordered

New Chapter in Hemisphere Health

DR. Abraham Horwitz of Chile took the oath of office as director of the Pan American Sanitary Bureau, Washington, D.C., January 15, 1959, to begin his duties on February 1. A few days later, in Geneva, he was formally inducted as director, Regional Office for the Americas, World Health Organization. Dr. Fred L. Soper, who is completing his third 4-year term as bureau director, now becomes director emeritus.

Participating in the ceremonies held in the Hall of the Americas of the Pan American Union were Dr. Soper; Dr. Guillermo Arbona, secretary of health of the Commonwealth of Puerto Rico and president of the 15th Pan American Sanitary Conference; Dr. Jose A. Mora, Secretary General of the Organization of American States; and Dr. Carlos Diaz-Collier of Mexico, chairman of the executive committee of the Pan American Health Organization.

Selections from the remarks on this occasion follow:

The Pan American Health Organization

"The 1947 constitution of the Pan American Sanitary Organization, now the Pan American Health Organization, boldly declares its field to be the entire Western Hemisphere, and opens its doors to all governments of the Americas to participation in the coordinated effort to combat disease, lengthen life, and promote physical and mental health. The agreements negotiated with the World Health Organization in 1949 and with the Organization of American States in 1950 have set the pattern for bridging the gap between the United Nations system and that of the Organization of American States, with a single technical, nonpolitical operating agency representing both systems.

"The Pan American Sanitary Bureau was created in 1902 with the limited objective of aiding the American republics in preventing the spread of epidemic diseases from one maritime port to another with a minimal interruption to the movement of ships. [The Bureau serves as the operating arm of the Pan American Health Organization, which is a specialized agency of the Organization of American States, and also as regional office of the World Health Organization.]

"The inauguration of Dr. Horwitz finds the Pan American Health Organization with a declared long-range hemispherical program devoted to three general activities:

- The strengthening of the fundamental health services of all countries of the Americas.
- The expansion of education and training programs and facilities for health workers.
- The coordination of national communicable disease control programs in campaigns of total regional eradication.

"To these must be added a fourth which is becoming increasingly important: the development and administration of special cooperative, long-term combined research training and field demonstration control programs in special fields. The Bureau has pioneered in such programs in the fields of nutrition, yellow fever, aftosa (foot and mouth disease), and the zoonoses.

"The mere enumeration of these objectives emphasizes the need for, and the advantages of, a continentwide health program with full participation of all countries of the Americas. . . .

"The Pan American Health Organization has made far-reaching commitments. It is committed to the eradication of malaria from the Western Hemisphere. Here it is in the fore-

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"To be successful, the malaria eradication programs of today require the active participation of local communities and individuals in local communities. It has been clearly demonstrated that to obtain this participation efficiently the techniques of the behavioral sciences must be used; thus knowledge in the emotional and social fields furthers physical health.

"Perhaps in the field of child health it is easier to illustrate a direct approach to emotional and social well-being. In the practice of pediatrics, in child health clinics and conferences, major emphasis has been on the child's nutrition and his protection against communicable diseases. The trend now, however, is for health workers to widen their scope and to consider the totality of the physical, emotional, and social well-being of the child. Disordered

behavior is just as clear a sign of the failure of the health team as continued prevalence of malaria. We must eradicate malaria but we must also help the people, whose lives we save, to be happy and productive.

"I feel certain that as more knowledge is accumulated in the behavioral sciences we will be better able to understand the individual person as a physical, emotional, and social being, as a member of the family, and of the community. This knowledge will enable us health workers to make a much greater contribution to the happiness of the human being."—Dr. GUILLERMO ARBONA, *secretary of health of the Commonwealth of Puerto Rico*.

The Purest Expression of Humanism

"After 57 years of effective accomplishment in the field of public health, the countries of this hemisphere have shown, without ostentation, the real possibilities of mutual understanding and cooperation for a noble cause. This is the essential meaning of the mission being performed by the Pan American Health Organization, of which the Pan American Sanitary Bureau is the secretariat. Its objectives are the purest expression of that humanism which thinks of man as the beginning and the end of all.

"To prevent disease, to prolong life, and to promote the health and welfare of the people are the purposes that our organization has been developing in this century, maintaining constant progress as our culture has evolved and as our society has gone through its vicissitudes. And for this reason, eradication of communicable diseases has been, and still is, in the forefront of the work of the organization.

"More than knowledge and experience, eradication of disease requires creative imagination, willingness to serve, perseverance, and courage. And these are some of the characteristics of the personality of Dr. Fred L. Soper, my illustrious predecessor, who has been called, with all justice, 'citizen of the Americas' in recognition of his work on behalf of continental health. . . .

"The path to be followed by the organization is well established. The doctrine is solid and clear, the principles and the methods well

proven, and the structure is flexible enough to be adapted to progress and needs. We will continue with the present programs of eradication of malaria and other scourges, and will start new ones against other diseases as soon as research and knowledge suggest the possibility. For eradication is a fight of man in his effort to survive against the designs of nature.

"While the countries are making substantial progress in this field, the need for more and well-prepared experts in the different branches of public health has become crucial. Their presence is indispensable for both national and international programs. Our organization will help to prepare them in the full breadth of the university spirit, having mankind and its environment as their ever-present objective. They should carry out their tasks mindful of the vision of the people and their feelings. With dedicated workers, every activity in public health is possible: to reduce infant mortality to rational levels, to provide better sanitation, to improve and to extend medical care, to strengthen local and national health services. In summary, to contribute to the welfare of the people and, thus, to the economic development of the countries.

"The technical progress of our time has increased enormously the scope and the consequences of human actions. It has stressed the need for a moral conscience above interests and conveniences. In the field of health our course is clear. The long and fruitful history of the Pan American Health Organization has demonstrated single-mindedness of purpose, looking steadily towards betterment of the health of the peoples of the Americas. Because I believe wholeheartedly that this goal is practical and realistic, I propose to continue the work of the organization along the lines which have been so well established. To achieve these ends I shall rely on the understanding and support of the member governments and their leaders in public health; on the joint effort of public and private international organizations, and on the devoted collaboration of the excellent staff of the Pan American Sanitary Bureau. I humbly offer my willingness to serve."—Dr. ABRAHAM HORWITZ, *director of the Pan American Sanitary Bureau*.

Milk Sanitation Honor Roll for 1957-58

Seventy-one communities have been added to the Public Health Service milk sanitation "honor roll," and 41 communities on the previous list have been dropped. This revision covers the period from January 1, 1957, to December 31, 1958, and includes a total of 298 cities and 102 counties.

Communities on the honor roll have complied substantially with the various items of sanitation contained in the milk ordinance suggested by the U.S. Public Health Service. The State milk sanitation authorities concerned report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk are sold.

The suggested milk ordinance, on which the milk sanitation ratings are based, is now in effect through

This compilation is from the Division of Sanitary Engineering Services, Bureau of State Services, Public Health Service. The previous listing, with a summary of rules under which a community is included, was published in Public Health Reports, September 1958, pp. 861-864. The rating method was described in Public Health Reports 53: 1386 (1938); reprint No. 1970.

voluntary adoption in 487 counties and 1,424 municipalities. The ordinance also serves as the basis for the regulations of 35 States and Hawaii. In 15 States and Hawaii it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as

stated in the suggested ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage communities operating under the suggested ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they are more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

Communities awarded milk sanitation ratings of 90 percent or more, 1957-58

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating	Community	Date of rating
Arizona		Georgia		Georgia—Continued	
Phoenix.....	2-1957	Albany.....	11-22-1957	Griffin.....	11-14-1957
Colorado		Athens.....	6-25-1958	La Grange.....	10-8-1958
Boulder County.....	8-1958	Atlanta.....	8-23-1957	Moultrie.....	10-29-1958
Colorado Springs.....	12-13-1957	Augusta.....	2-14-1958	Paulding County.....	7-25-1958
Denver.....	8-27-1957	Bainbridge.....	3-25-1958	Quitman.....	8-13-1958
Las Animas-Huerfano		Cairo.....	5-7-1958	Savannah.....	7-18-1958
Counties.....	4-22-1958	Calhoun-Gordon		Statesboro-Bulloch	
Pueblo County.....	2-23-1958	County.....	8-12-1958	County.....	3-27-1957
Weld County.....	10-24-1957	Canton.....	10-30-1958	Valdosta.....	3-12-1958
District of Columbia		Cartersville.....	1-30-1957	Waycross.....	3-14-1958
Washington.....	3-6-1958	Columbus.....	1-18-1957		
		Dalton-Whitfield		Illinois	
		County.....	5-21-1957	Chicago.....	6-13-1957
		Douglas County.....	7-25-1958		

Communities awarded milk sanitation ratings of 90 percent or more, 1957-58—Continued
100 PERCENT OF MARKET MILK PASTEURIZED—Continued

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Illinois—Continued</i>		<i>Indiana—Continued</i>		<i>Kentucky—Continued</i>	
East Side Health District.....	6- 5-1958	Madison.....	7-23-1958	Louisville and Jefferson County.....	3-...-1958
Brooklyn.....		Marion County.....	4- 2-1958	Mayfield and Graves County.....	8- 2-1957
Cahokia.....		Michigan City.....	4-23-1958	Maysville.....	7-23-1957
East St. Louis.....		Monticello.....	10-16-1958	Monticello.....	6-19-1958
Fairmont City.....		Muncie.....	5-29-1958	Morganfield and Union County.....	1-21-1958
National City.....		New Castle.....	4-24-1958	Morgantown.....	1-10-1958
Washington City.....		North Manchester.....	7- 3-1957	Murray and Calloway County.....	2- 5-1958
Evanston.....	3-13-1957	Peru.....	10-30-1958	Newport and Campbell County.....	10-18-1957
North Shore municipalities.....	3-20-1957	Richmond.....	4-24-1957	Owensboro.....	5- 9-1958
Glencoe.....		Rochester.....	9-17-1958	Owenton.....	3-31-1958
Highland Park.....		South Bend.....	12-11-1957	Paducah.....	7-31-1957
Kenilworth.....		Union City.....	7- 3-1957	Paris and Bourbon County.....	1-...-1958
Lake Bluff.....		Vincennes.....	10- 3-1957	Pendleton County.....	4- 2-1958
Lake Forest.....		Warsaw.....	8-15-1958	Pike County.....	7-22-1958
Northfield.....		Winchester.....	5- 7-1957	Prestonsburg and Floyd County.....	7-22-1958
Wilmette.....		<i>Iowa</i>		Shelby County.....	1-17-1958
Winnetka.....		Cedar Rapids.....	10- 9-1958	Smithland and Livingston County.....	2- 7-1958
Oak Park.....	3- 6-1957	Davenport.....	7-24-1958	Taylorsville and Spencer County.....	6-30-1958
Peoria.....	4-17-1958	Des Moines.....	7- 3-1958	Webster County.....	5-22-1958
		Dubuque.....	6-20-1958		
<i>Indiana</i>		Iowa City.....	10- 9-1958	<i>Mississippi</i>	
Anderson.....	5-22-1957	<i>Kentucky</i>		Amory.....	4- 8-1958
Berne-Bluffton area.....	10-17-1958	Bardstown and Nelson County.....	5-21-1957	Booneville.....	8-28-1957
Bloomington.....	1-10-1958	Bell County.....	4-19-1957	Brookhaven.....	1-15-1958
Bremen.....	1-29-1958	Benton and Marshall County.....	2- 6-1958	Canton.....	9-30-1958
Calumet region.....	4-24-1957	Bowling Green and Warren County.....	7-22-1957	Clarksdale.....	1- 9-1957
East Chicago.....		Brandenburg.....	4-11-1957	Columbia.....	8- 7-1958
Gary.....		Butler and Falmouth.....	4- 2-1958	Columbus.....	7-16-1958
Hammond.....		Campbellsville.....	4- 5-1957	Corinth.....	7- 9-1957
Columbia City.....	6-20-1958	Covington.....	6-13-1957	Greenville.....	10-21-1958
Cooperative Grade A area.....	2-13-1958	Cynthiana and Harrison County.....	4- 8-1958	Grenada.....	9-24-1957
Holland.....		Danville and Boyle County.....	4-...-1958	Hattiesburg.....	5-16-1958
Huntingburg.....		Elizabethtown.....	1- 8-1958	Hernando.....	1- 7-1957
Jasper.....		Frankfort.....	10-18-1957	Houston.....	6-26-1957
Tell City.....		Greenville.....	1-21-1958	Iuka.....	7-11-1957
Elkhart, Goshen, Napoleon area.....	12- 5-1957	Hardinsburg and Breckinridge County.....	10-22-1958	Kosciusko.....	6-12-1958
Evansville.....	6- 5-1958	Harrodsburg.....	2-20-1957	Laurel.....	5-20-1958
Fort Wayne.....	7-15-1958	Hodgenville.....	10-20-1958	Louisville.....	8-18-1958
Frankfort.....	6-10-1957	Hopkinsville and Christian County.....	9-26-1957	Macon.....	2-26-1958
Indiana Falls City area.....	10-16-1957	Lawrenceburg and Anderson County.....	6- 5-1958	Meadville.....	3- 7-1957
Jeffersonville.....		Leitchfield and Grayson County.....	10-10-1957	Meridian.....	2-27-1958
New Albany.....		Liberty.....	11-18-1958	New Albany.....	10-10-1957
Salem.....				Oxford.....	8-27-1957
Scottsburg.....					
Kokomo.....	2-19-1957				
Lafayette and W. Lafayette.....	5- 5-1958				
Lake County.....	3-25-1957				
Logansport.....	3-27-1958				

Communities awarded milk sanitation ratings of 90 percent or more, 1957-58—Continued

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Mississippi—Continued</i>		<i>North Carolina—Continued</i>		<i>Tennessee—Continued</i>	
Pascagoula.....	6-19-1957	Onslow County.....	5-20-1957	Milan.....	11-11-1958
Picayune.....	10-30-1957	Orange County.....	8-13-1957	Morristown.....	7-10-1958
Starkville.....	3-13-1957	Pamlico County.....	5-24-1957	Mountain City.....	10-28-1958
State College.....	3-13-1957	Pasquotank County.....	5- 2-1958	Mount Pleasant.....	5-19-1958
Tupelo.....	4- 9-1957	Perquimans County.....	5- 2-1958	Murfreesboro.....	8-14-1957
West Point.....	7-15-1958	Person County.....	8-13-1957	Nashville-Davidson	
		Pitt County.....	4- 1-1958	County.....	10-28-1957
<i>Missouri</i>		Richmond County.....	7-30-1958	Newport.....	1- 7-1958
Chillicothe.....	3- 5-1957	Rocky Mount.....	2-27-1958	Paris.....	9- 4-1957
Kansas City.....	6-11-1958	Rowan County.....	6-28-1957	Pulaski.....	9-12-1958
St. Joseph.....	4-14-1958	Sampson County.....	5-22-1958	Rogersville.....	1-29-1958
St. Louis.....	11-26-1957	Scotland County.....	11-22-1957	Sparta.....	4-18-1958
St. Louis County.....	6- 4-1958	Stanly County.....	9-10-1958	Sweetwater.....	9-23-1958
Sedalia.....	8- 7-1957	Transylvania County.....	10-20-1958	Trenton.....	11- 5-1958
Sikeston.....	2-11-1958	Tyrrell County.....	2- 6-1958	Tullahoma.....	10-13-1958
Springfield.....	5-13-1958	Washington County.....	2- 6-1958	Waverly.....	8-26-1958
		Wayne County.....	1-27-1958	Winchester.....	10-16-1958
<i>Nebraska</i>		Wilson County.....	1-27-1958		
Omaha.....	2-19-1958			<i>Texas</i>	
		<i>Ohio</i>		Big Springs.....	12-14-1957
<i>Nevada</i>		Lima.....	10- 1-1957	Borger.....	6-27-1958
Clark, Lincoln, and Nye		<i>Oklahoma</i>		Brady.....	6-26-1957
Counties.....	5- 1-1957	Bartlesville.....	2-26-1957	Brownwood.....	6-21-1957
		Tulsa.....	6-21-1957	Bryan.....	10- 5-1957
<i>North Carolina</i>				Burkburnett.....	1-14-1958
Alamance County.....	3-15-1957	<i>Tennessee</i>		Cleburne.....	1-17-1958
Beaufort County.....	5-22-1957	Athens.....	9-25-1958	College Station.....	10- 5-1957
Bertie County.....	2- 7-1958	Bristol.....	11- 7-1957	Corpus Christi.....	11- 1-1957
Bladen County.....	4- 9-1958	Clarksville.....	2- 7-1958	Denison.....	10-30-1957
Camden County.....	5- 2-1958	Cleveland.....	5- 8-1958	Edinburg.....	3-14-1958
Chatham County.....	8-13-1957	Clinton.....	9-16-1958	El Paso.....	2-13-1958
Chowan County.....	5- 2-1958	Columbia.....	5-19-1958	Falfurrias.....	2-15-1958
Craven County.....	8-30-1957	Cookeville.....	4-18-1958	Galveston.....	6-27-1958
Cumberland County.....	3-28-1958	Cowan.....	10-16-1958	Gladewater.....	2-19-1957
Durham County.....	4-22-1958	Decherd.....	10-16-1958	Gonzales.....	6-21-1957
Edgecombe County.....	5-21-1958	Elizabethton.....	5-28-1957	Harlingen.....	2-15-1958
Forsyth County.....	2-22-1957	Erwin.....	10-30-1958	Houston.....	6-13-1958
Gates County.....	7-31-1958	Fayetteville.....	6-10-1958	Kerrville.....	4-11-1957
Guilford County.....	6-18-1958	Franklin.....	5-15-1958	Kilgore.....	2-19-1957
Halifax County.....	9-13-1957	Greeneville.....	1-28-1958	Kingsville.....	11-14-1957
Harnett County.....	10-15-1958	Humboldt.....	11- 5-1958	Lufkin.....	7- 9-1958
Haywood County.....	3-14-1958	Huntingdon.....	10-28-1958	McAllen.....	3-14-1958
Henderson County.....	10-20-1958	Jackson-Madison		Midland.....	12-14-1957
Hertford County.....	7-31-1958	County.....	10-14-1958	Mineral Wells.....	6-21-1957
Iredell County.....	7- 1-1958	Kingsport.....	1-30-1958	New Braunfels.....	1-31-1957
Lee County.....	3- 7-1957	Knoville-Knox Coun-		Odessa.....	12-14-1957
Lenoir County.....	9-10-1958	ty.....	9-25-1957	Port Arthur.....	10-23-1957
Martin County.....	8-13-1958	Lewisburg.....	6- 9-1958	San Angelo.....	8- 8-1957
Mecklenburg County.....	3- 7-1958	Lexington.....	10-30-1958	San Antonio.....	4- 1-1957
Moore County.....	5-15-1958	Loudon.....	5-26-1958	San Benito.....	2-12-1958
Nash County.....	1-17-1957	Manchester.....	10-15-1958	Sherman.....	10-31-1957
New Hanover County.....	4-21-1958	Memphis.....	3-24-1958	Texarkana.....	12-10-1957
Northampton County.....	7-31-1958			Tyler.....	3- 5-1957

Communities awarded milk sanitation ratings of 90 percent or more, 1957-58—Continued
100 PERCENT OF MARKET MILK PASTEURIZED—Continued

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Illinois—Continued</i>		<i>Indiana—Continued</i>		<i>Kentucky—Continued</i>	
East Side Health Dis- trict:-----	6- 5-1958	Madison-----	7-23-1958	Louisville and Jefferson County-----	3-...-1958
Brooklyn-----		Marion County-----	4- 2-1958	Mayfield and Graves County-----	8- 2-1957
Cahokia-----		Michigan City-----	4-23-1958	Maysville-----	7-23-1957
East St. Louis-----		Monticello-----	10-16-1958	Monticello-----	6-19-1958
Fairmont City-----		Muncie-----	5-29-1958	Morganfield and Union County-----	1-21-1958
National City-----		New Castle-----	4-24-1958	Morgantown-----	1-10-1958
Washington City-----		North Manchester-----	7- 3-1957	Murray and Calloway County-----	2- 5-1958
Evanston-----	3-13-1957	Peru-----	10-30-1958	Newport and Campbell County-----	10-18-1957
North Shore municipali- ties:-----	3-20-1957	Richmond-----	4-24-1957	Owensboro-----	5- 9-1958
Glencoe-----		Rochester-----	9-17-1958	Owenton-----	3-31-1958
Highland Park-----		South Bend-----	12-11-1957	Paducah-----	7-31-1957
Kenilworth-----		Union City-----	7- 3-1957	Paris and Bourbon County-----	1-...-1958
Lake Bluff-----		Vincennes-----	10- 3-1957	Pendleton County-----	4- 2-1958
Lake Forest-----		Warsaw-----	8-15-1958	Pike County-----	7-22-1958
Northfield-----		Winchester-----	5- 7-1957	Prestonsburg and Floyd County-----	7-22-1958
Wilmette-----		<i>Iowa</i>		Shelby County-----	1-17-1958
Winnetka-----		Cedar Rapids-----	10- 9-1958	Smithland and Living- ston County-----	2- 7-1958
Oak Park-----	3- 6-1957	Davenport-----	7-21-1958	Taylorsville and Spen- cer County-----	6-30-1958
Peoria-----	4-17-1958	Des Moines-----	7- 3-1958	Webster County-----	5-22-1958
		Dubuque-----	6-20-1958		
		Iowa City-----	10- 9-1958		
<i>Indiana</i>		<i>Kentucky</i>		<i>Mississippi</i>	
Anderson-----	5-22-1957	Bardstown and Nelson County-----	5-21-1957	Amory-----	4- 8-1958
Berne-Bluffton area-----	10-17-1958	Bell County-----	4-19-1957	Booneville-----	8-28-1957
Bloomington-----	1-10-1958	Benton and Marshall County-----	2- 6-1958	Brookhaven-----	1-15-1958
Bremen-----	1-29-1958	Bowling Green and Warren County-----	7-22-1957	Canton-----	9-30-1958
Calumet region:-----	4-24-1957	Brandenburg-----	4-11-1957	Clarksdale-----	1- 9-1957
East Chicago-----		Butler and Falmouth-----	4- 2-1958	Columbia-----	8- 7-1958
Gary-----		Campbellsville-----	4- 5-1957	Columbus-----	7-16-1958
Hammond-----		Covington-----	6-13-1957	Corinth-----	7- 9-1957
Columbia City-----	6-20-1958	Cynthiana and Harrison County-----	4- 8-1958	Greenville-----	10-21-1958
Cooperative Grade A area:-----	2-13-1958	Danville and Boyle County-----	4-...-1958	Grenada-----	9-24-1957
Holland-----		Elizabethtown-----	1- 8-1958	Hattiesburg-----	5-16-1958
Huntingburg-----		Frankfort-----	10-18-1957	Hernando-----	1- 7-1957
Jasper-----		Greenville-----	1-21-1958	Houston-----	6-26-1957
Tell City-----		Hardinsburg and Breck- inridge County-----	10-22-1958	Iuka-----	7-11-1957
Elkhart, Goshen, Nap- panee area-----	12- 5-1957	Harrodsburg-----	2-20-1957	Kosciusko-----	6-12-1958
Evansville-----	6- 5-1958	Hodgenville-----	10-20-1958	Laurel-----	5-20-1958
Fort Wayne-----	7-15-1958	Hopkinsville and Chris- tian County-----	9-26-1957	Louisville-----	8-18-1958
Frankfort-----	6-10-1957	Lawrenceburg and An- derson County-----	6- 5-1958	Macon-----	2-26-1958
Indiana Falls City area:-----	10-16-1957	Leitchfield and Grayson County-----	10-10-1957	Meadville-----	3- 7-1957
Jeffersonville-----		Liberty-----	11-18-1958	Meridian-----	2-27-1958
New Albany-----				New Albany-----	10-10-1957
Salem-----				Oxford-----	8-27-1957
Scottsburg-----					
Kokomo-----	2-19-1957				
Lafayette and W. Lafa- yette-----	5- 5-1958				
Lake County-----	3-25-1957				
Logansport-----	3-27-1958				

publications

The Recognition of Lead Poisoning in the Child. *PHS Publication No. 620; 1958; 8 pages; 10 cents.*

A clinical description of lead poisoning in children is presented in this pamphlet written for the practicing physician. Emphasizing the imperative of early diagnosis, it discusses incidence, etiology, symptoms, laboratory confirmation, and treatment.

A short bibliography is included.

Vital Statistics of the United States, 1956. Volume I. *NOVS Publication; 378 pages; \$1.*

Similar in coverage to the 1955 report, this volume carries introductory material; all statistics for Alaska, Hawaii, Puerto Rico, and the Virgin Islands (U.S.); and marriage, divorce, natality, fetal mortality, and infant mortality statistics for the United States and each State.

The introduction, which includes 73 tables, discusses sources of vital data, history of vital registration, classification and interpretation of vital data, life tables, and analysis of the mortality statistics already published in volume II.

Recommended Dietary Allowances. *NAS-NRC Publication No. 598; 1958; 36 pages; \$1.*

On the basis of the best current scientific evidence, the Food and Nutrition Board recommends levels of nutrient intake considered most likely to provide maintenance of good nutrition for healthy persons in the United States. The allowances are obtainable from multiple combinations of dietary patterns.

Recommendations are made for calories, protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, ascorbic acid, and vitamin D. Also considered are other nutrients for which human requirements are not quantitatively established, but which

are likely to be included in the dietary patterns.

Copies may be purchased from the Publications Office, National Academy of Sciences-National Research Council, 2101 Constitution Avenue, N.W., Washington 25, D.C.

Tuberculosis Chart Series, 1958 Revision. *PHS Publication No. 639; 1958; 44 pages; 35 cents.*

A comprehensive presentation of the statistical aspects of tuberculosis in the United States, this revision combines some of the related topics in the 1957 edition and brings the material up to date.

Discussion of the usefulness of BCG and selected information from special studies are also included.

Organization and Staffing for Full-Time Local Health Services, December 31, 1956. *PHS Publication No. 634; 1958; by Clifford H. Greve and Josephine R. Campbell; 52 pages; 35 cents.*

The organization and staffing of 1,425 full-time local health units are analyzed.

Tables and charts show extent of coverage of the Nation by full-time local health organizations, selected characteristics of organized areas, financial capacity of those areas and their expenditures for public health, and public health personnel employed by official health agencies and by other official agencies.

The Industrial Environment: Its Evaluation and Control. Syllabus for short courses for industrial hygiene engineers and chemists presented at Occupational Health Field Headquarters, Cincinnati, Ohio. *PHS Publication No. 614; 1958; 36 pages; \$2.75.*

Lecture outlines, extensive reference lists, and laboratory exercises have been assembled to provide guidance to engineers and chemists new to the field of occupational

health and to furnish a review of basic procedures and techniques for experienced workers. The material has been developed in short courses presented by the Public Health Service.

The syllabus deals primarily with fundamental principles and methods used in the evaluation and control of the working environment, with emphasis on sampling and analysis and engineering control measures. Inplant air contaminants, radiation, noise, illumination, and ventilation are among the major topics. No material is included on clinical, toxicological, or physiological aspects of occupational health hazards.

Complimentary copies are restricted to students participating in the courses, but sale copies are available.

Sampling the Air. How air pollution is measured and studied. *PHS Publication No. 642; 1958; 5 pages; 5 cents.* Defines air pollution and describes its obvious effects. Sketches background and growth of national air sampling network. Outlines sampling procedures and resultant observations.

The Air We Live In. The health effects of air pollution. *PHS Publication No. 640; 1958; 7 pages; single copies, 10 cents, \$5 per 100.* Warns against polluted air. Describes effects as nuisance and health menace, recalls episodes of mass illness and fatalities, and discusses research.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

Communities awarded milk sanitation ratings of 90 percent or more, 1957-58—Continued
100 PERCENT OF MARKET MILK PASTEURIZED—Continued

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Texas—Continued</i>		<i>Virginia—Continued</i>		<i>Wisconsin</i>	
Vernon.....	6-21-1957	Christiansburg.....	8- 7-1958	Appleton.....	1-10-1957
Wichita Falls.....	1-25-1958	Franklin.....	6- 7-1957	Beaver Dam.....	2- 6-1957
		Norfolk.....	6- 5-1958	Beloit.....	1-23-1958
<i>Utah</i>		Portsmouth.....	3- 7-1957	Eau Claire.....	2- 7-1957
Logan.....	5-22-1958	Pulaski.....	8- 7-1958	Green Bay.....	10-11-1957
Ogden.....	10-30-1957	Radford.....	8- 7-1958	Kenosha.....	7- 5-1957
Salt Lake City.....	5- 6-1958	Richmond.....	4-18-1958	La Crosse.....	1-29-1957
Utah County.....	11-29-1957	Roanoke.....	7- 3-1958	Madison.....	11-29-1957
		Staunton.....	4- 4-1958	Manitowoc.....	4-12-1957
<i>Virginia</i>		Suffolk.....	6- 6-1957	Milwaukee.....	8-28-1957
Abingdon.....	11- 7-1957	Waynesboro.....	12- 5-1957	Oshkosh.....	7- 9-1958
Alexandria.....	6-28-1957			Ripon.....	2- 6-1957
Blacksburg.....	8- 7-1958	<i>Washington</i>		Sheboygan.....	7-26-1957
Bristol.....	11- 7-1957	Spokane.....	10-29-1958	Waupun.....	2- 6-1957
		Whitman County.....	10-17-1958		

BOTH RAW AND PASTEURIZED MARKET MILK

<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>
<i>Georgia</i>		<i>Missouri</i>		<i>Texas—Continued</i>	
Americus, 91.9.....	8-25-1958	Joplin, 91.4.....	2- 5-1958	Fort Worth, 99.98.....	6-14-1957
Cedartown, 96.9.....	8-31-1957			Longview, 99.....	2-20-1957
Fitzgerald, 97.9.....	4-11-1957	<i>North Carolina</i>		Marshall, 98.....	1- 4-1957
Gainesville, 95.6.....	9-19-1958	Buncombe County, 98.7.....	4- 1-1958	Palestine, 99.2.....	10- 2-1957
Rome, 99.1.....	10-16-1957	Cleveland County, 91.8.....	9-11-1958	Paris, 99.....	12- 5-1957
Thomasville, 96.3.....	6-24-1958	Gaston County, 97.9.....	7-19-1957		
Washington, 99.8.....	3- 1-1957	Robeson County, 98.....	3-11-1958	<i>Virginia</i>	
Winder, 99.....	3- 7-1957	Wake County, 99.9.....	1-27-1958	Charlottesville, 99.6.....	9-27-1957
		Wilkes County, 99.48.....	5- 8-1958		
<i>Idaho</i>		<i>Tennessee</i>		<i>Washington</i>	
Ada County, 96.....	1-11-1957	Harriman, 95.....	4- 2-1958	Benton and Franklin	
		Kingston, 96.5.....	4- 2-1958	Counties, 99.7.....	9-25-1958
<i>Kentucky</i>				Seattle-King County,	
Madisonville, 99.....	1-25-1957	<i>Texas</i>		99.7.....	4- 9-1957
Somerset and Pulaski		Abilene, 90.....	10-10-1957		
County, 96.....	8-29-1958	Amarillo, 99.7.....	8-13-1957	<i>West Virginia</i>	
		Austin, 99.4.....	1-28-1957	Kanawha County, 99.3.....	8-29-1958
<i>Mississippi</i>		Brenham, 95.5.....	7-11-1958	Monongalia County,	
Biloxi, 99.....	3-28-1958	Brownsville, 98.7.....	2-12-1958	97.8.....	8- 9-1957
Gulfport, 99.....	3-27-1958				

NOTE: In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90 percent or more compliance with the grade A raw

milk requirements, of the milk ordinance suggested by the United States Public Health Service.

Notice particularly the percentage of the milk pasteurized in the various communities listed. This per-

centage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized, whether commercially or at home, before it is consumed.

Geographic and Seasonal Variations in Births

BENJAMIN PASAMANICK, M.D., SIMON DINITZ, Ph.D.,
and HILDA KNOBLOCH, M.D.

IN previous investigations we have attempted to demonstrate the relationship of climatic variations during the first trimester of pregnancy to the birth of mentally deficient children. In the most recent study we tested the hypothesis that above-average summer temperatures during the third month of pregnancy, the critical period of fetal central nervous system development, are associated with an increased risk of being born mentally defective. This hypothesis was substantiated for the period of 1913-48 based on the date of birth, and therefore of conception, of mentally defective children admitted to the Columbus State School, Ohio (1).

We have shown also that complications of pregnancy are significantly more frequently encountered in pregnancies resulting in winter deliveries (2). The importance of this finding is that mental deficiency and neuropsychiatric disorders during childhood which are attributable to brain injury were highly associated with complications of pregnancy (3). Thus, the complications of pregnancy as well as mental deficiency were far greater among children conceived during the late spring and early

summer months than were expected. In interpreting this chain of evidence, we suggested that either decreased protein intake during the summer months or heat stress or both were etiologically related to the greater proportion of impaired children born during the winter months. Decreased protein intake and heat stress have been suggested as etiological factors in prenatal and postnatal mortality, morbidity, and congenital defects.

This study attempts to add still another dimension to our interest in climatic conditions and their impact on the birth process and prenatal and postnatal development. It has been known for a long time that there are marked seasonal variations in the birth rates in the United States and, indeed, throughout western civilization. According to data on all monthly births in 1955 by State, race, and sex which are reported in the United States vital statistics reports, there is a pronounced trough in the percentage of births occurring in the spring months of March, April, and May and a corresponding peak in the late summer months of August and September. This biannual variation applies to births of white and nonwhite and male and female children.

The August-September peak has traditionally and more or less facetiously been attributed to the longer and colder winter months. The explanation for the consistent spring dip in births has been more difficult to formulate. We believe that the annual spring decline in births may be attributed to three interrelated factors but primarily to the discomforts of high summer temperatures and high humidity. This

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ECHOES from Public Health Reports

An Experimental Study of the Relation of Hydrogen Ion Concentrations to the Formation of Floc in Alum Solutions.

By EMERY J. THERIAULT, Assistant Chemist, and W. MANSFIELD CLARK, Chief of Division of Chemistry, Hygienic Laboratory, United States Public Health Service

In approaching a scientific analysis of the art of water clarification it seems to us essential to distinguish the several aspects of the subject. These are so integrated in actual plant operation that it is difficult to perceive the true importance of each of the several factors which have to be mastered by the operator under every exigency. The isolation of phenomena, and their exact quantitative evaluation, will alone permit a true appraisal of any factor in relation to the process as a whole.

We have limited our attention to certain laboratory experiments which clarify one distinct aspect of the alum process. Our data doubtless lack the scope desirable for general practical application, but they indicate that, unless factors still to be investigated have an unexpected influence, maximum precipitation of added aluminium will occur within definite and narrow limits of hydrogen ion concentration.

It is well recognized that a precipitate is not formed from alum when the final solution is either too "acid" or too "alkaline." Hitherto the essential degree of "acidity" or "alkalinity" has been sought in the *quantity* of acid or alkali determined by one or another analytical method. More recently there has been a growing appreciation of the fact that the waterworks operator is dealing with reversible reactions, that his task is to control equilibria, and that all too many methods of the analyst, devised originally for irreversible reactions, upset an established equilibrium to yield a false value to the case at hand.

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Emery J. Theriault collaborated with W. Mansfield Clark in showing the relation of hydrogen ion concentrations to the formation of floc in alum solutions, a basic contribution to further studies.

tures and long winters; (c) the three most northeasterly States (Maine, New Hampshire, and Vermont) characterized by cold winters and moderately cool summer temperatures; and (d) two northwestern States (Washington and Oregon) of temperate climate the year round.

The findings on the variations in the percentage of births by month and season of year in these four sets of States and in the United States tend to support the seasonal variation thesis with regard to births. Figures 1-5 present typical patterns in these regions. Our analysis is, however, based on all the aforementioned States. The southern States show a marked decline in births during the spring months and a correspondingly high peak in the number of late summer births. The midwestern and northeastern States show a lesser trough in spring births. The northwestern States of Washington and Oregon exhibit no spring trough at all. In fact, in these States the number of spring births is slightly higher than expected. The data also indicate, but not at all conclusively, that male births are fewer just prior to and during the descending curve of the spring depression. It has been demonstrated that males are apparently much more at risk of prenatal brain injuries than females (5).

Three interrelated factors are postulated as responsible for the decreased birth rate in the spring months in the United States as a whole and in the southern States in particular. First, it is suggested that uncomfortable temperatures in the summer reduce the frequency of coition and thereby the risk of conceiving during the summer months. This possibility was discussed previously. Second, an equally plausible hypothesis is that there is an increased fetal death rate among conceptions occurring immediately prior to and during the summer months. Some evidence is already available which lends credence to this proposition. For example, infant death rates in the first 28 days of life are higher in the spring months. Also, it has been shown that prenatal stress via the hypothalamic-pituitary-adrenocortical system and dietary deficiencies during the early critical period of fetal development, the first trimester, result in fetal deaths in animals (6).

The third explanation of the spring decline in births is purely statistical in character and admittedly accounts for a small fraction, at most 10 percent, of this decline. The argument here is that increased births during the peak summer months automatically decrease the risk of conception and delivery of children during the preceding and succeeding

Figure 4. Adjusted monthly variations in births of white males and white females in Maine, 1955.

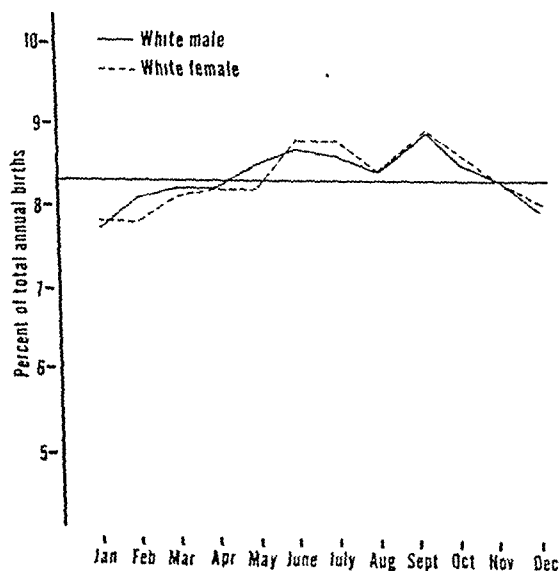
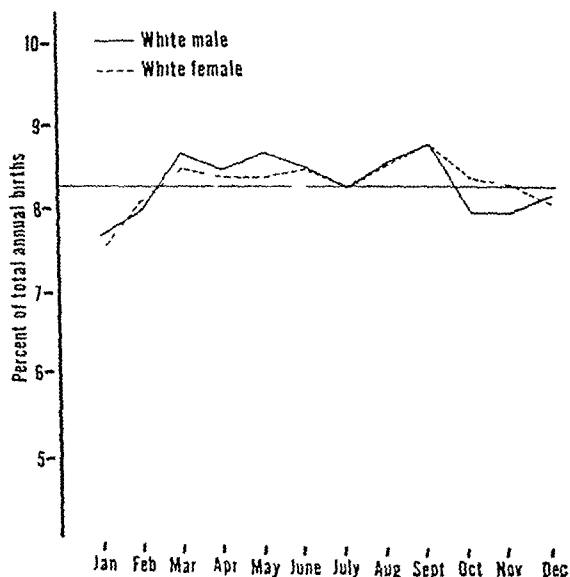


Figure 5. Adjusted monthly variations in births of white males and white females in Washington, 1955.



discomfort (there is now a single discomfort index combining temperature and humidity readings which is used by the U.S. Weather Bureau) probably reduces the frequency of coition and consequently of conceptions. It is also possible that high temperatures operate

Figure 1. Adjusted monthly variations in births of white males and white females in the United States, 1955.

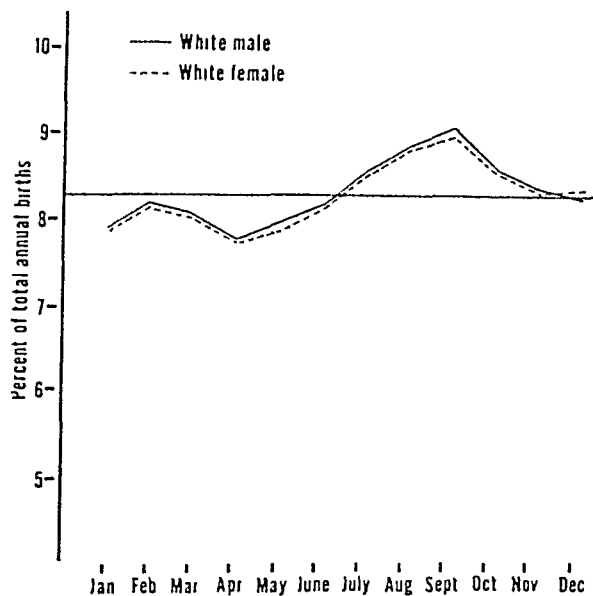
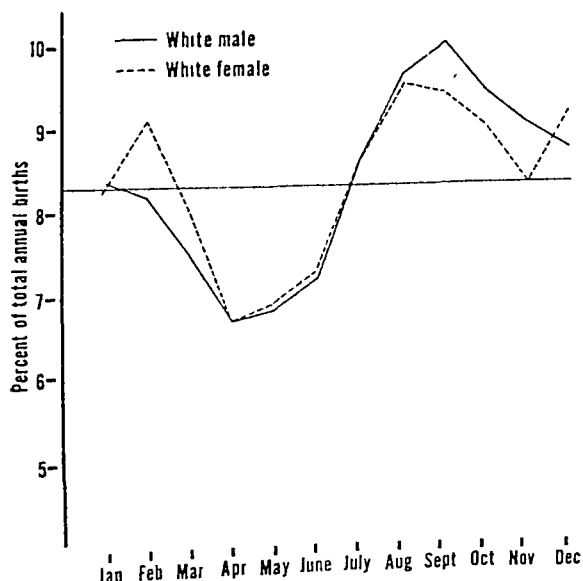


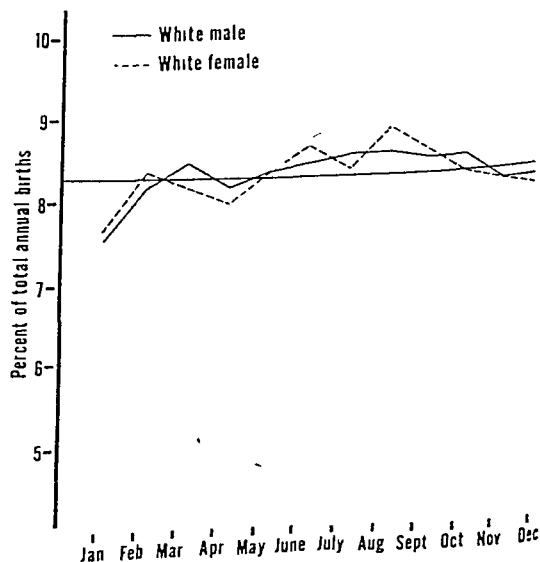
Figure 2. Adjusted monthly variations in births of white males and white females in Mississippi, 1955.



in some way (for example, sperm attrition) to reduce the conception rate when coition is held constant. Incidentally, if this hypothesis is correct, the spring trough in births should be significantly more characteristic of births among the lower socioeconomic status groups, who are less able to escape the summer temperatures, than among the higher socioeconomic groups. This hypothesis has already been substantiated in one major city, Baltimore, Md. Births among upper class families, according to our unpublished data, were significantly more random than among the lower socioeconomic groups or among nonwhites.

If it is true that the greater the discomfort index in the summer, the smaller the percentage of spring births, then States which have the hottest, most humid summers should have significantly lower spring births than States which have cooler, less humid summers. From the 1955 data on births by month of year, State, sex, and race (4), data for the following groups of States were selected: (a) three southern States (Alabama, Louisiana, and Mississippi) of relatively similar socioeconomic composition and with hot summers and relatively warm winters; (b) two midwestern States (Minnesota and Wisconsin) having relatively short summers with extreme tempera-

Figure 3. Adjusted monthly variations in births of white males and white females in Minnesota, 1955.



In this fifth-year study of children exposed to a fluoridated public water supply, it was found that the inhibition of caries is a function of the length of time they were exposed to fluoride prior to the eruption of their teeth.

Dental Caries in Maryland Children

After 5 Years of Fluoridation

A. L. RUSSELL, D.D.S., M.P.H., and CARL L. WHITE, A.B.

MARKED inhibition of dental caries after 5 years of fluoridation has been demonstrated in a series of independent studies of school children (1-8). This report describes a similar finding in somewhat more minute detail.

The children under study are residents of Prince Georges and Montgomery Counties, Md., immediately adjacent to the District of Columbia. All are white; all were born and have resided continuously in the area, and none has received such caries-preventive treatment as the topical application of fluoride solutions. Characteristics of the population, methods employed, and some of the techniques of analysis have been described in detail in previous publications (9, 10). In brief, teeth were examined under adequate light with mirror and explorer by a small and carefully calibrated group of examiners. "Catches" were not counted as carious lesions in the absence of other indications of caries. Examinations have been made yearly since 1952, when the community water was fluoridated. The fifth year results are presented in this paper.

In 1952 the Washington Suburban Sanitary Commission maintained two filtration plants,

which supplied the water used by the children in the study. The average daily fluoride content of finished water at one plant was 0.98 ppm during the first year and 0.94 ppm during the second; fluoride content of finished water at the other plant was 0.90 ppm during both years. From January 1954 to January 1957, the average daily determination was 1 ppm fluoride at both plants, with most monthly averages within the range of 0.97 to 1.03 ppm fluoride. Since July 1955, all water has been processed in a single plant. The fluoridating vehicle has been sodium fluosilicate.

Mean numbers of teeth in eruption were virtually the same in 1957 as in 1952. There were 1.2 percent fewer deciduous teeth present and 0.01 percent fewer permanent teeth present in 1957 than would have been expected on the basis of 1952 eruption data.

Total Caries Experience

Differences in total caries experience in the children between 1952 and 1957 are shown in tables 1, 2, and 3 and figures 1 and 2.

Significantly more children were free of caries in deciduous teeth at ages 5 and 6, and significantly more were free of caries in permanent teeth at all ages from 6 through 10, in 1957 than in 1952 (table 1). At 5 and 6 years of age, 87 percent and 49 percent, respectively,

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spring months. In some of the northern States with only a very minor annual spring decline this explanation alone might bring the curve up to the normal statistical expectancy.

A number of additional aspects deserve brief consideration in the interpretation of these findings. Major changes in marriage and birth patterns have occurred since the last war. Since we have restricted ourselves to postwar data, comparisons with earlier periods of time in the seasonal variations in these patterns should be a valuable next step in this series of studies. Nonetheless, it should be stressed that the impact of the seasonal peaks and troughs in marriages are biased against our hypothesis (that is, the effect of June marriages should increase the spring birth rate or at least help reduce the trough). Again, the improving economic situation of lower socioeconomic groups should, if our hypothesis is correct, eventually randomize the monthly variations in births in this stratum. Finally, the monthly birth variations for nonwhites are generally less extreme than for lower class whites. One plausible explanation for this phenomenon is the postulated greater stress encountered by nonwhites throughout the year so that stresses connected with high temperature add proportionately less variation in their birth rates than for lower class whites.

It would seem that the evidence, although in-

complete, suggests another application of preventive measures that may affect maternal and infant mortality and morbidity. The increased access of many persons in our society to the means of reducing the stress associated with semitropical summer climates might make a very real difference in infant and maternal mortality and morbidity.

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Improper Drug Source Halted

Nasal inhalers containing basic amphetamine now will be sold only by prescription, as the result of a Food and Drug Administration regulation published in the *Federal Register* February 10, 1959. FDA received evidence of misuse of inhalers for nonmedical purposes by persons who removed the wicks and used the drug as a substitute for amphetamine tablets. The tablets always have been restricted to prescription sale but the inhalers have been sold directly to the public.

Action was taken on the basis of complaints of misuse from law enforcement officials and the agency's own investigation. Nasal inhalers containing other drugs are not affected by the ruling, the agency added.

Figure 2. Increase in mean numbers of decayed, missing, or filled teeth in native-born children of Montgomery and Prince Georges Counties, Md., by age groups.

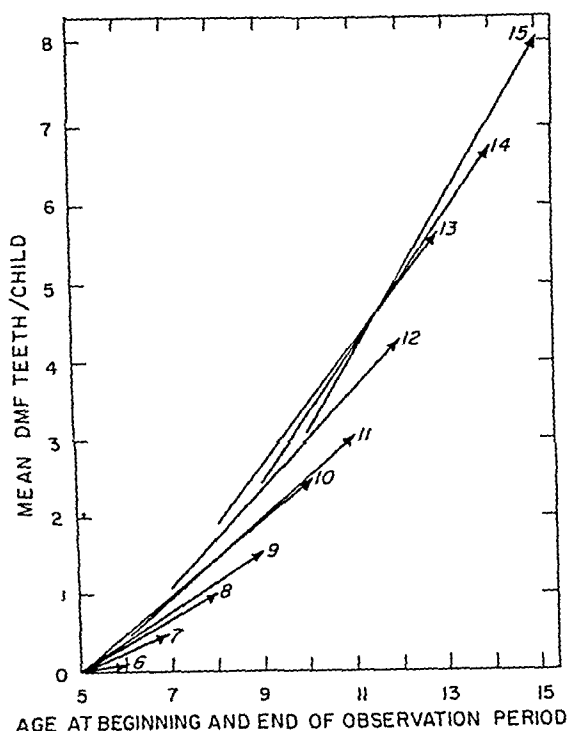


Table 2. Mean numbers of def¹ deciduous and DMF² permanent teeth at the outset of fluoridation and 5 years later, Montgomery and Prince Georges Counties, Md.³

Age last birthday (years)	Mean numbers of def deciduous teeth		Mean numbers of DMF permanent teeth	
	1952	1957	1952	1957
5.....	2.77	¹ 1.30	0.03	0.00
6.....	3.67	² 2.76	.41	⁴ .10
7.....	4.04	3.68	1.09	⁴ .51
8.....	3.78	4.19	1.90	⁴ 1.05
9.....	3.43	3.74	2.42	⁴ 1.59
10.....	2.30	2.31	3.09	⁴ 2.49
11.....	1.29	1.36	4.39	⁴ 3.04
12.....	.47	.48	4.96	4.28
13.....	.16	.14	6.15	5.64
14.....	.07	.07	7.66	6.73
15.....	.00	.06	8.57	8.14

¹ Decayed, extraction indicated, or filled.

² Decayed, missing, or filled.

³ All children are native born and are continuous residents of the area; none has received topical fluoride or other caries-preventive treatment.

⁴ Difference significant at the $P=.01$ level.

Table 3. Expected and observed incidence of new DMF¹ teeth in children using fluoridated water between 1952 and 1957, Montgomery and Prince Georges Counties, Md.

Age interval (years)	Age at time of fluoridation	Incidence of new DMF teeth per child per year	
		Expected ²	Observed
10-15.....	10	1.10	1.01
9-14.....	9	1.05	.86
8-13.....	8	.85	.75
7-12.....	7	.77	.64
6-11.....	6	.80	.53
5-10.....	5	.62	.50
5-9.....	4	.60	.40
5-8.....	3	.63	.35
5-7.....	2	.55	.27
5-6.....	1	.41	.10

¹ Decayed, missing, or filled.

² If 1952 rates had remained unchanged.

these incidence slopes in succession, it will be noted that the rate of caries increase is successively lower in each younger age group (see also table 3).

Mortality rates for permanent teeth were importantly lower in 1957 than in 1952, showing an overall decline at ages 6-13 of about 45 percent. But this change cannot be ascribed wholly to fluoridation, since a school dental health program was begun in the larger county shortly after the study began, and children examined in 1957 had, on the average, about one-third more filled teeth than were seen in children of the same ages in 1952. Filled teeth comprised 44.8 percent of the total number of DMF teeth in 1952 and 66.5 percent of the total number of DMF teeth in 1957.

Permanent First Molars

In the 2 years under consideration, most of the DMF teeth observed in children through 10 years of age were permanent first molars. Considerably fewer DMF first molars were found in 1957 than in 1952, with the differences generally related to the age of the children at the time of fluoridation. Table 4 shows the numbers of DMF permanent first molars which would have been counted in 1957 had the 1952 attack rates remained unchanged; these numbers are compared with the actual numbers seen in children aged 5-12 years.

Table 1. Proportions of caries-free children at the outset of fluoridation and 5 years later: Montgomery and Prince Georges Counties, Md.¹

Age last birthday (years)	Numbers examined		Percent caries-free in deciduous dentition		Percent caries-free in permanent dentition	
	1952 (N=1,950)	1957 (N=2,872)	1952	1957	1952	1957
5.....	60	67	36.7	² 68.7	98.3	9.
6.....	171	215	26.9	² 40.0	81.3	² 9
7.....	211	256	22.3	21.9	50.7	² 7.
8.....	181	251	14.9	16.7	32.6	² 53
9.....	223	239	18.4	20.1	19.7	² 37
10.....	199	220	33.7	30.9	16.6	² 25
11.....	191	157	52.1	51.7	12.6	14
12.....	228	307	77.2	77.3	8.3	7.
13.....	233	468	91.0	91.9	6.9	5.
14.....	188	416	91.1	93.3	3.7	4.
15.....	65	126	100.0	93.7	7.7	3.

¹ All children are native born and are continuous residents of the area; none has received topical fluoride or other caries-preventive treatment.

² Difference significant at the $P=.01$ level.

more children had caries-free deciduous teeth. Differences in permanent teeth ranged upward from 16 percent at the age of 6, with the greatest difference in 9-year-old children. At this age, nearly twice as many children with caries-free permanent teeth were observed in 1957 as in 1952.

Mean numbers of deciduous and permanent teeth with caries experience (the def and DMF means, respectively) are shown in table 2 for each age group in each of the study years. In 1957, fewer def teeth per child were found in children up through the age of 7 years and fewer DMF teeth per child in all age groups, than in 1952. Differences were significant in deciduous teeth for children 5 and 6 years of age and in permanent teeth for children aged 6-11 years. Data for the 2 years are compared in figure 1.

The incidence of new carious permanent teeth for each age-cohort over the period of observation is pictured in figure 2. Children who were 10 years old in 1952, for example, had an average of 3.09 DMF teeth; at the age of 15 years, 5 years later, the average had risen to 8.14, a mean increment of 1.01 new DMF teeth per child per year. For children 9 years of age and younger, the incidence is shown from a zero point at the age of 5 years, the time at which permanent teeth begin to erupt. If a straight edge is laid along each of

Figure 1. Mean numbers of deciduous and permanent teeth with caries in native-born children of Montgomery and Prince Georges Counties, Md., 1952 and 1957.

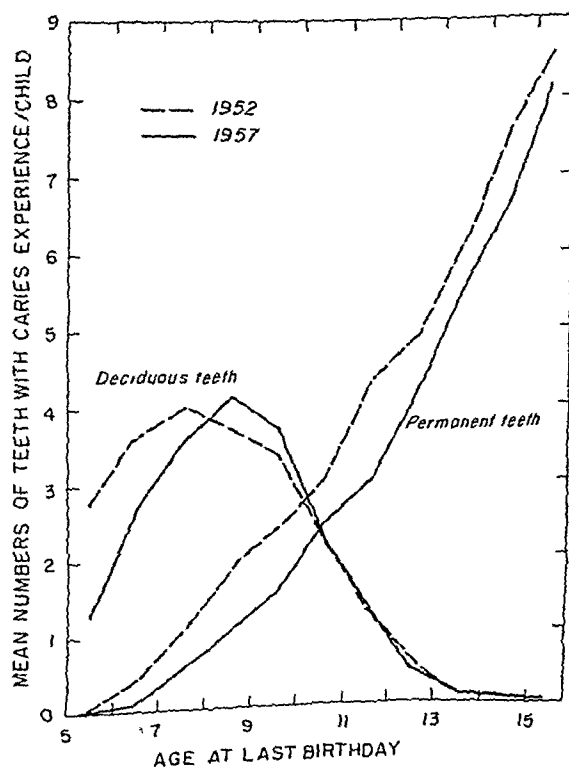


Figure 2. Increase in mean numbers of decayed, missing, or filled teeth in native-born children of Montgomery and Prince Georges Counties, Md., by age groups.

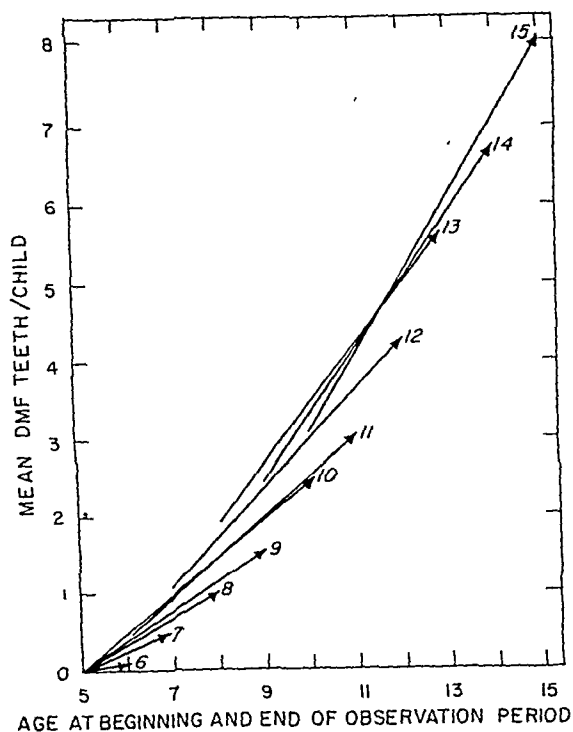


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² If 1952 rates had remained unchanged.

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In the 2 years under consideration, most of the DMF teeth observed in children through 10 years of age were permanent first molars. Considerably fewer DMF first molars were found in 1957 than in 1952, with the differences generally related to the age of the children at the time of fluoridation. Table 4 shows the numbers of DMF permanent first molars which would have been counted in 1957 had the 1952 attack rates remained unchanged; these numbers are compared with the actual numbers seen in children aged 5-12 years.

Table 4. Expected and observed numbers of carious first permanent molars in native-born children of Montgomery and Prince Georges Counties, Md., 1957

Age group (years)	Age at time of fluoridation	Number of children (N=1,832)	Carious first molars expected ¹ (Σ=3,529)	Carious first molars observed (Σ=2,820)	Difference (percent)
5-----	<1	67	2	0	-100.0
6-----	1+	245	100	25	² -75.0
7-----	2+	256	277	138	² -50.2
8-----	3+	251	471	263	² -44.2
9-----	4+	239	523	368	² -29.6
10-----	5+	220	572	413	² -27.8
11-----	6+	157	449	404	-10.0
12-----	7+	397	1,135	1,209	+6.5

¹ If 1952 caries attack rates had remained unchanged.

² Difference significant at the $P=.01$ level.

In table 5, caries attack rates for permanent first molars computed from the 1952 data are compared with attack rates actually observed during this fifth year of fluoridation in those children aged 6-12 years who were examined in 1956 and reexamined in 1957. Though more caries-free first molars were present in children of each age group in 1957, these teeth were decaying at approximately the 1952 rates in children who were 4 years of age or older at the time of fluoridation. In children 3 years of age or younger at the time of fluoridation, attack rates were sharply and significantly lower than those seen in 1952.

In general, attack rates in mandibular first molars were more severe than attack rates in

maxillary first molars, but both tended to follow the same patterns with age.

Older Children

Children 12 years old or older have been slower to exhibit a caries-inhibitory effect following fluoridation than younger children, when comparisons are based on lifetime caries experience. The incidence of new DMF teeth in children aged 13 or 14 years at the end of the third year of fluoridation in these Maryland counties has been reported in an earlier paper (10). At the time of fluoridation those children were 10 or 11 years old. No decrease in the incidence of caries was evident in that group during the 1954-55 year.

Table 5. Caries attack rates in first permanent molars, 1956-57, the fifth year of fluoridation, native-born children of Montgomery and Prince Georges Counties, Md.

Age last birthday (years)	Expected ¹		Observed in children examined in 1956 and again in 1957			
	Mean teeth at risk ²	Attack rate ³	Number of children	Mean teeth at risk ²	Attack rate ³	Age at time of fluoridation
6-----	2.733	13.8	37	2.756	⁴ 2.9	1+
7-----	3.335	20.1	192	3.945	⁴ 8.4	2+
8-----	2.897	27.5	180	3.236	⁴ 13.0	3+
9-----	2.121	14.6	186	3.022	18.0	4+
10-----	1.812	22.6	176	2.171	24.1	5+
11-----	1.402	18.6	116	1.922	22.9	6+
12-----	1.089	0.1	121	1.248	30.4	7+

¹ Computed from 1952 data.

² Number of teeth per child that were caries-free at the beginning of the year and those that erupted during the year.

³ Percentage of teeth becoming carious during the year.

⁴ Difference significant at the $P=.01$ level.

Table 6. Mean numbers of DMF¹ permanent teeth in 653 boys and girls 13 or 14 years of age at the beginning and end of the fifth year of fluoridation (1956-57), Montgomery and Prince Georges Counties, Md.

Type of tooth	Mean numbers of DMF teeth			
	Start of year		End of year	
	Expected ²	Observed	Expected ²	Observed
<i>Maxillary</i>				
Central incisor.....	0.43	³ 0.30 ± 0.025	0.49	³ 0.39 ± 0.028
Lateral incisor.....	.43	³ .33 ± .025	.51	³ .40 ± .027
Cuspid.....	.04	³ .01 ± .005	.07	³ .02 ± .006
First bicuspid.....	.14	.14 ± .016	.26	³ .19 ± .019
Second bicuspid.....	.14	.11 ± .014	.24	³ .19 ± .019
First molar.....	1.36	³ 1.50 ± .030	1.50	³ 1.66 ± .027
Second molar.....	.40	³ .22 ± .022	.70	³ .43 ± .028
All maxillary teeth.....	2.93	2.61	3.78	3.29
<i>Mandibular</i>				
Central incisor.....	0.07	0.08 ± 0.015	0.07	0.11 ± 0.017
Lateral incisor.....	.07	.06 ± .012	.08	.08 ± .014
Cuspid.....	.01	.01 ± .005	.02	.02 ± .007
First bicuspid.....	.04	.03 ± .008	.09	³ .05 ± .010
Second bicuspid.....	.14	.11 ± .016	.23	³ .17 ± .018
First molar.....	1.62	1.64 ± .028	1.67	³ 1.73 ± .024
Second molar.....	.73	³ .43 ± .029	1.07	³ .73 ± .034
All mandibular teeth.....	2.68	2.36	3.22	2.87
All teeth.....	5.61	³ 4.97 ± .129	7.00	³ 6.16 ± .147

¹ Decayed, missing, or filled.

² If rates observed in 1952 had remained unchanged.

³ Difference significant at the $P=.01$ level.

Similar data for the 653 children examined in 1956 and reexamined in 1957 who were 13 or 14 years of age at the end of the fifth year of fluoridation are shown in table 6. The differences between expected and actual numbers of teeth in eruption, in this group, were negligible; means of 26.33 and 27.38 teeth would have been expected on the basis of 1952 eruption data, and means of 26.24 and 27.35 teeth were actually observed. In 1957 there were slightly but significantly more DMF permanent first molars than had been seen in 1952. Means for the relatively caries-immune mandibular incisors and cuspids were essentially the same. Means for all other tooth types were significantly lower.

Crude incidence data may be computed from table 6. However, because of the greater numbers of teeth at risk, comparison with 1952 findings is more valid when based on attack rates (table 7). In general, the differences between expected attack rates and those observed during

this fifth year of fluoride exposure are related to the age of the tooth at the time of fluoridation. Permanent first molars, for example, had been in eruption about 3 years when first exposed to fluoride; the few remaining caries-free first molars were actually becoming carious at a faster rate than would have been predicted from 1952 findings. At the other end of the scale, permanent second molars, which erupted 2 to 3 years after fluoridation began, included significantly fewer carious teeth at the beginning of the year (see table 6), and attack rates during the year were sharply and significantly lower than expected. Attack rates were lower in all teeth erupting after fluoridation, but in only one of the teeth (the maxillary lateral incisor, with the shortest time at risk at that point) which were in eruption before fluoridation began.

Differences between expected and observed caries attack rates (omitting the mandibular incisors, teeth with attack rates too low for va-

Table 7. Expected and actual caries attack rates in 653 boys and girls 13 and 14 years of age during the fifth year of fluoridation, Prince Georges and Montgomery Counties, Md., 1956-57

Type of tooth	Years at risk at start of fluoridation ¹	Mean DMF per child at start of year		Attack rate during year ²		Total teeth becoming carious in year	
		Expected ²	Observed	Expected ²	Observed	Expected ²	Observed
	Teeth in eruption and at risk of caries prior to fluoridation						
Mandibular central incisor-----	3.08	0.07	0.08	0	1.2	0	15
Mandibular first molar-----	2.96	1.62	1.61	12.0	⁴ 21.4	28	57
Maxillary first molar-----	2.86	1.36	1.50	22.5	⁴ 31.2	73	101
Maxillary central incisor-----	2.03	.43	.30	3.8	5.3	42	59
Mandibular lateral incisor-----	2.01	.07	.06	.1	1.1	5	14
Maxillary lateral incisor-----	.95	.43	.33	5.2	4.2	55	45
Total-----	2.32	3.98	3.92	3.9	5.5	203	291
	Teeth erupting after fluoridation						
Mandibular cuspid-----	-1.06	0.01	0.01	0.5	0.2	7	3
Maxillary first bicuspid-----	-1.27	.14	.11	6.7	⁴ 3.1	81	37
Mandibular first bicuspid-----	-1.29	.01	.03	2.4	1.0	31	13
Maxillary cuspid-----	-2.02	.01	.01	1.9	.5	23	6
Maxillary second bicuspid-----	-2.07	.11	.11	6.0	4.8	71	57
Mandibular second bicuspid-----	-2.11	.14	.11	5.1	3.1	59	36
Mandibular second molar-----	-2.57	.73	.43	29.1	⁴ 20.3	280	196
Maxillary second molar-----	-3.22	.40	.22	21.5	⁴ 13.3	224	139
Total-----	-1.95	1.61	1.06	8.3	5.2	776	487

¹ Measured from the median time of eruption to the mean age of the group at the time of fluoridation.

² If 1952 rates had remained unchanged.

³ The percentage of teeth which were free of caries at the beginning of the year, or erupted during that time, which became carious during the year.

⁴ Significantly different at the $P=.01$ level.

lidity in a sample of this size) are shown in figure 3. In preparing this illustration teeth have been numbered from the midline toward the posterior part of the mouth. A bracket open at the top indicates position in the upper jaw, and a bracket open at the bottom indicates position in the lower jaw. The numeral 3 in a bracket open at the bottom, for example, indicates the mandibular cuspid.

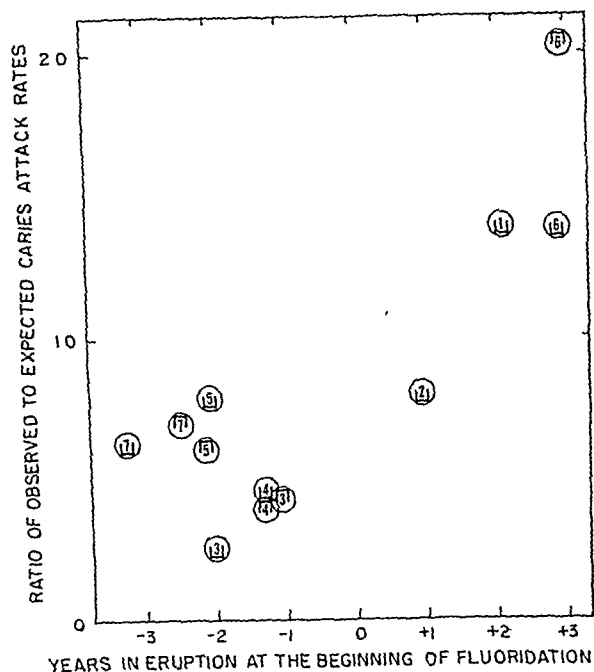
Discussion

So far as the deciduous dentition is concerned, little caries-inhibitory effect is evident in the data for children who were 2 years old or older at the time of fluoridation (7 years old or older in 1957). The most striking difference is shown in children aged 5 years in 1957, whose first waterborne fluoride exposure occurred during the period of calcification, and hence prior to

eruption, of these teeth. Six-year-old children showed an intermediate degree of inhibition. Their deciduous teeth were fully calcified, but not in eruption, at the time fluoridation began.

Similarly, the younger the child at the time of fluoridation the greater the degree of caries inhibition in permanent first molars. In older children the greater degree of caries inhibition was seen in those tooth types first exposed to fluoride at the earlier stages in development. The critical point would seem to be the time of eruption. Tooth types with first fluoride exposure essentially coincident with eruption show minimal caries inhibition, and those in eruption 2 to 3 years at the time of fluoridation show no inhibitory effect which can be detected in counts of DMF teeth. In short, at this point (the fifth year of fluoridation) and measured in this way, the degree of caries inhibition in any tooth type seems to be a simple function

Figure 3. Differences between expected caries attack rates and rates observed during the fifth year of fluoridation, by eruption status of teeth, Montgomery and Prince Georges Counties, Md.



of the length of fluoride exposure prior to eruption and the consequent risk of attack by dental caries.

Attack rates for children 13 or 14 years of age were slightly higher than expected during the third year of study (10), and they continued to be higher in permanent first molars in children of these ages in this fifth year. These facts suggest that (a) the prevalence of caries in this area may have been following an upward trend at the time the study was initiated, or (b) there may have been a gradual shift toward more stringent criteria over the course of the six yearly examinations.

Some such shift is inherent in the increased numbers of filled teeth. Bitewing X-ray examination is standard procedure in private dental offices in the area, which means that a proportion of these fillings represented lesions which could not have been detected by mirror and explorer until the following year.

In either event, the effect of such a shift would be toward a slight underestimation of the true magnitude of caries reduction.

Summary and Conclusion

A group of white, native-born children in Prince Georges and Montgomery Counties, Md., has been examined yearly since fluoridation of the community water supply in 1952. Their total caries experience after 5 years of fluoridation and the incidence of caries during the fifth year are compared with data from the baseline examination.

In this group at this time caries inhibition seems to be a simple function of the length of fluoride exposure prior to eruption of teeth and the risk of caries attack.

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Simplified Method of Setting Clinic Fees

ALLEN HODGES, Ph.D.
DALE C. CAMERON, M.D.

IN its community mental health program, Minnesota is using the Federal income tax paid the previous year as the base for establishing the maximum fee for clinic psychiatric service. This method eliminates time-consuming investigations and complicated mathematical calculations. Yet it provides fee schedules tied to the patient's ability to pay, as required by State law. (Community Mental Health Services Act, 1957.)

The Federal income tax a patient pays is a fairly reliable index of his real economic situation, since it takes into account, in addition to income, such factors as number of dependents, other taxes paid, interest, and excessive medical and dental expenses. Still another advantage of using this figure is its ready availability, for almost everyone keeps a copy of his Federal income tax forms from year to year.

Currently, the maximum charge per clinic visit per family in the Minnesota community mental program is 1 percent of the Federal in-

come tax. (A family rate is provided when more than one member is attending the clinic, based on 1 percent of the Federal tax divided by the number of family members receiving service.) This percentage was set by the department of welfare, in consultation with private psychiatrists and lay groups concerned with mental health, to give what are believed to be realistic fees for service in this program. The percentage may easily be manipulated to alter the charges or to keep the charges the same should the base be altered (a change in the Federal tax rate, for instance). Examples of the fees that would be charged according to the 1 percent formula are given in the table.

In addition to the maximum percentage, a \$10 fee was set as the absolute maximum that could be charged. Prospective patients able to pay more than \$10 according to their income tax payments should be referred to private psychiatric services.

No charge, or only a token charge, is made if the individual paid no tax. Local mental health centers are free to make allowances for recent changes in income or other extenuating circumstances in setting fees within the statewide maximums.

Choice of these procedures for establishing fee schedules followed a survey of methods used in 92 outpatient clinics in Illinois, Minnesota, and New York and in the clinics of California's

Dr. Hodges, now assistant professor of educational psychology, University of Minnesota College of Education, Minneapolis, was until January 1959, the psychological consultant for the community mental health services program, Minnesota Department of Public Welfare, St. Paul. Dr. Cameron is director of the welfare department's division of medical services.

community mental health program. In all the grant-in-aid clinics, provisions are made for the care of psychiatrically indigent patients. Among patients making some payment the median minimum fee was 25 cents, for persons with annual incomes of less than \$2,000. The median maximum fee was \$15, for patients with annual incomes of more than \$7,000.

According to the survey, the fees charged are very similar from clinic to clinic and State to State, but the method of arriving at the annual income figures upon which the fee is based varies tremendously. Some clinics use a gross income figure, and others use an adjusted annual income figure calculated by complicated procedures which require considerable time.

Examples of maximum fees for psychiatric clinic visits

Minnesota community mental health program

	Gross income	Taxable income ¹	Taxes paid	Maximum fee per visit
<i>Single person</i>	\$4,500	\$3,450	\$719	\$7.19
<i>with no dependents</i>	5,000	3,900	818	8.18
<i>(1 exemption)</i>	6,000	4,800	1,048	10.48
 <i>Married person</i>	4,500	2,850	570	5.70
<i>with no dependents,</i>	5,000	3,300	660	6.60
<i>joint return</i>	6,000	4,200	844	8.44
<i>(2 exemptions)</i>	7,000	5,100	1,042	10.42
 <i>Married person</i>	4,500	1,050	210	2.10
<i>with 3 children</i>	5,000	1,500	300	3.00
<i>(5 exemptions)</i>	6,000	2,400	480	4.80
	7,000	3,300	660	6.60
	8,000	4,200	844	8.44
	9,000	5,100	1,042	10.42

¹ Computed by subtracting \$600 per exemption and the standard 10 percent deduction.

A Diet Record Technique

MARY HELEN R. GOODLOE, B.S., CARROLL B. QUINLAN, M.D.,
and J. GORDON BARROW, M.D.

A DIET record technique adapted by us for use in a study of the dietary habits of Trappist and Benedictine monks is described in this report. The study was undertaken to determine whether the dietary habits of the two monastic populations differed sufficiently, especially as regards fat intake, to make them suitable for investigating the relationship between the development of atherosclerosis and dietary habits. No detailed analysis of the diets is given in this paper.

Participation in the study was on a completely voluntary basis. Sixty-five Benedictines (93 percent of the community) and 82 Trappists (97 percent of the community) participated in the study.

The Trappist community abstains from eating meat and consumes a lacto-ovo-vegetarian diet. Previous studies (1,2) of the Trappist diet suggested that it was much lower in fat content than the one consumed by most Americans. The Benedictine community, on the other hand, is omnivorous, consuming a diet which in outward appearance is typically American.

Both monasteries are cloistered and their regulations prohibit women from entering the community. Since we did not have a male nutritionist to conduct individual dietary interviews, the dietary history technique described by Burke (3) was not feasible. The size of the

communities, the long-term aspect of the study, and the lack of personnel and of laboratory facilities precluded the use of detailed balance studies involving measured food intake and fecal and urinary output. These unique circumstances required that a suitable technique be devised for obtaining reliable and valid individual diet characterizations. The repetitive diet record technique (4) described below was felt to be the most suitable for our purpose.

The two religious communities have many things in common regarding the preparation and serving of food. However, there were certain differences which required that the dietary record technique be modified slightly in each monastery.

The Qualitative Aspect

In both the Trappist and Benedictine monasteries the monks eat in a common refectory, and the food is prepared in a central kitchen. There is no selective menu in the sense of a choice of foods. Their only choice is whether or not they eat what is served and in the quantity of each item consumed.

The information obtained from the monastery cook in the central kitchen during the study is termed by us the "qualitative aspect" of the diet record. The method of deriving this qualitative information was as follows in both monasteries. On the day selected for dietary study the physician (Quinlan), acting as liaison between the monastery and the research nutritionist (Goodloe), obtained from the monastery cook the following information:

1. The recipes for each food prepared, including brand and trade names of the ingredients used.

The authors are associated with the Heart Disease Control Program of the Georgia Department of Public Health, Atlanta. Mrs. Goodloe is research nutritionist, Dr. Quinlan, associate director, and Dr. Barrow, director of the program. Their research was supported by Grant No. H-3262 from the National Heart Institute, National Institutes of Health, Public Health Service.

2. The total amount of each food prepared and served to the community.
3. The number of monks who ate the meal.
4. The amount of each food which was returned to the kitchen as waste.
5. In the case of individual food servings, the weight, size, or number of items in a serving (for example, the weight of one pork chop, the number of peach halves in a dessert serving, the weight of a slice of bread, and so on).

The Quantitative Aspect

Although both monasteries prepared their food similarly in a central kitchen, the method of serving the food differed in the Trappist and Benedictine communities.

In the Trappist monastery the main food items were served from a common table. Each monk received an equal amount of each food and drink. Thus each monk received one serving of potato, one bowl of soup, one tin of coffee, one dessert, and so on. The Trappists were not allowed second helpings of these basic foods. There were, however, a few items, such as bread, sugar, and peanut butter, which could be taken as desired.

The food in the Benedictine monastery was served in a different manner. The food prepared in the central kitchen was placed on the common refectory table, and each monk took as much or as little of each food as he desired.

Many of the foods had been divided in the kitchen into individual servings (for example, one baked pork chop, a brick of ice cream, and so on), although there were a few foods, such as mashed potatoes and string beans, which were served in bulk form.

The information obtained from each monk during this study has been termed the "quantitative aspect" of the diet record. This quantitative information was obtained in both monasteries from diet records kept by the monks. On the day selected for dietary study each monk was given a mimeographed menu listing all the food items which were being served on that particular day. Each monk took this menu with him to the refectory and noted during the meals the number of servings of each item which he consumed. Additional space was allotted on the diet questionnaire to indicate foods which were provided on special diets or eaten between regular meals.

Standardization of Food Servings

Since each monk reported bulk items in his quantitative diet record in terms of the number of servings consumed, it was necessary to standardize the amount represented by "a serving."

This standardization of servings was not difficult in the Trappist monastery since each Trappist monk was served the same amount of food from a common table. A sample meal was

Method used in a dietary record technique for deriving average caloric intake per person per day in a Trappist monastery

Type of day	Calories per diet	Average value for each type of day	Frequency of each type of day during year ¹	Total yearly value for each type of day (in calories)
Fast day:				
Diet No. 1	2,383	2,375	103	244,625
Diet No. 3	2,367			
Feast day:				
Diet No. 4	4,421	4,421	60	265,260
Regular day:				
Diet No. 2	3,350	3,394	202	685,588
Diet No. 5	3,508			
Diet No. 6	3,324			
Total				1,195,473
Daily average (total ÷ 365)				3,275

¹ Represents the method of weighting the caloric intake for each type of day.

brought from the Trappist monastery to the research nutritionist who measured the amount of each serving by weight and volume. Items such as sugar and peanut butter, which were available in any quantity desired, were reported according to the number of spoonfuls consumed, using a standard soup spoon which we supplied the monastery. The capacity of all ladles, scoops, drinking mugs, and soup bowls used in serving the food was carefully measured.

The standardization of food servings at the Benedictine monastery was difficult only for those items which were not prepared as individual servings but were presented in bulk form. In order to standardize these servings, standard food models were demonstrated at the monastery showing the monks several examples of what we considered one standard serving. They were requested to keep this idea of a serving in mind when they filled in the quantitative diet record.

Reproducibility and Accuracy

A review of repetitive diet records shows that individual monks regularly eat the same amount of certain foods such as bread, sugar, and coffee. This fact strengthens the argument for the reliability of this diet record technique (5).

In order to check the accuracy with which the participants filled in the quantitative diet record sheet, the amount of a given food item reported by all the monks was totaled (for example, the total number of servings of mashed potato reported consumed by the whole community). This figure was compared with the total quantity of this food item which the cook reported he had prepared minus the waste which was returned to the kitchen. It was found that these two figures agreed closely when checked many times with different foods.

It is interesting that the results obtained for the Benedictine monks, whom we considered to be consuming an average American diet, checked closely with dietary studies (6,7) of other populations elsewhere in this country as regards total calories and percentage of calories from fat, protein, and carbohydrate.

Technique of Dietary Computation

The recipes obtained from the monastery cooks were analyzed, and the calories and nu-

trients in a serving of each food were calculated by using standard food tables (8-11). In addition, two food items in common usage were analyzed by the Georgia Department of Agriculture. The wheat grown by the Trappists and used in making bread, which is a staple item in their diet, was analyzed for fat and protein content (fat, 1.4 percent; protein, 13.0 percent). The milk in use at each monastery was analyzed for fat content (Trappist, 5 percent; Benedictine, 5.4 percent).

This information was combined with the quantitative aspect of the diet record filled out by each monk, and a complete dietary analysis for each individual was computed for that day in terms of the following dietary components (9):

Calories	Vitamin A, IU
Animal protein, gm.	Thiamine, mg.
Vegetable protein, gm.	Riboflavin, mg.
Animal fat, gm.	Vitamin C, mg.
Vegetable fat, gm.	Saturated fatty acids, gm.
Cholesterol, mg.	Unsaturated fatty acids, gm.:
Carbohydrate, gm.	linoleic acid, gm.;
Calcium, gm.	linolenic acid, gm.;
Phosphorus, gm.	arachidonic acid, gm.
Iron, mg.	

Selection of Days for Study

The diet in both monasteries is affected by seasonal variation and religious tradition (1,2). The winter and summer diets differ, and these in turn may be subdivided into fast days, feast days, and regular days. The study days in each community were selected arbitrarily with the provision that both summer and winter, and fast, feast, and regular days were represented. Care was taken to space the study days throughout the year. Weekends, periods of fast (such as Fridays and Lent), and special feast days were equally represented in the diet study days chosen in each community.

On several occasions the monastery cook was requested to keep a 10-day record of the foods which were served in the monastery. These 10-day surveys were reviewed to make sure that the study days differed in no way from the menus which were being served in the monastery on days which were not being studied.

In calculating the average diet for the year for each monk the results of the individual daily

diets studied were weighted in proportion to the frequency with which that type of diet appeared during the year. For instance, six diets were studied for each individual in the Trappist monastery; one feast day, two fast days, and three regular days were represented. The weighting of each diet in obtaining the average diet for the year was accomplished as follows.

There were 202 regular days in the year. The nutrients on three of these days were averaged and multiplied by 202. These total values for regular days were added to the total values for the same nutrients on feast days and fast days weighted in the same fashion, and the yearly total was obtained. Dividing any one of these totals by 365 yielded the average daily consumption of this particular nutrient by this individual monk (see table).

Preliminary Results

A wide variation in dietary habits between monks within each group has been observed, and this has led us to believe that any epidemiological study of the relationship between diet and atherosclerosis must take into consideration the average individual dietary intake and not the average food habits of that particular group. Therefore, on planning further study of these two groups it is felt that continued individual diet analysis will be necessary.

Repetitive diet records were obtained for 82 Trappist monks and 65 Benedictine monks. Six diets were calculated for each Trappist and 4 for each Benedictine. Preliminary results were:

Calories	Benedictine	Trappist
Average per day-----	2,896	3,203
Fat (percent)-----	45	26
Protein (percent)-----	13	10
Carbohydrate (percent)-----	42	64

Statistical analysis in relation to fat content of the respective diets has shown that the two groups differ significantly in their percentage of calories derived from fat (t test: $P < 0.001$).

Summary

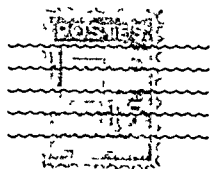
In a repetitive dietary record technique adapted for use in a study of Trappist and

Benedictine monks, quantitative and qualitative dietary records were used in calculating average daily individual dietary intake. Results indicate that the method is a substantially reliable and accurate one.

Preliminary findings show a significant difference in the fat content of the diet of the two communities. It is concluded that the two groups are suitable for the study of the relationship between dietary habits and atherosclerosis.

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INTERNATIONAL MAIL POUCH

Yaws in Gwagwalada

A request by medical authorities at Kaduna, capital of the Northern Region of Nigeria, for a survey of prevalence of yaws brought me to the small territory of Abuja where, shortly after 6 a. m., I met the local emir. He asked me, as a personal favor, to examine and treat the members of his household. At his harem, I examined his four wives, relatives, servants, and a great number of children; my nurse gave each the prescribed injection of penicillin.

An hour later, we packed our equipment into the Land Rover, and, followed by the emir in his car, drove 75 kilometers to Gwagwalada. Several hundred people were waiting, sitting quietly on the ground in the village square. They had come from 15 or 20 different villages. Some had walked 10 to 15 kilometers that morning. I set up my table in the square, with the emir on my left and on my right a nurse who noted the results of the examinations on a separate record for each patient.

It is not strictly necessary to give treatment when making a survey of this kind. But these people had come so far and so seldom see a doctor that we had agreed, although it meant extra work, that each man, woman, and child should get an injection of penicillin. It would cure yaws and many other ailments, such as ulcers, infected sores, pneumonia, and gonorrhea.

One patient followed another in a steady stream. After being examined and registered, they went to the treatment hut where a male nurse scrubbed each right buttock with soap and water and an assistant dried and swabbed it with alcohol. The patients then placed both hands on a waist-high horizontal bar while a specially trained nurse gave the intramuscular injection of the dose prescribed. The villagers laughed and joked as they passed along the line.

As I worked I noticed that the farther the villages were from the road, the more their people suffered from yaws. Gwagwalada had only 1 percent of infectious cases and 4 percent of yaws of all types; villages 10 to 15 kilometers away showed rates of 7 percent and 13 percent.

At 4 p. m. new groups of men and women, carrying their children, began to arrive. They came from an almost inaccessible village, reached only by fording 2 or 3 big rivers. They had not been told to come, but, hearing about a doctor who was giving away a marvelous remedy which would cure many ills, they had set out forthwith on their long, hard trek. One of them, an old man carrying a child of 5 or 6 years, told me it was the first time anything like this had happened to his people.

The day's work ended at 6 p. m., and we were very tired. *Since early morning we had seen and treated 2,125 persons.* Our supply of penicillin was finished, and the treatment hut looked like a battlefield.

—DR. JEAN FRAISEE, *medical director of the anti-yaws campaign in Nigeria, summarized from his report published in World Health, September-October 1958.*

Rehabilitation Bookshelf

The International Society for the Welfare of Cripples and the Committee for the Handicapped of the People to People Program has given a 43-volume rehabilitation bookshelf to the Faculty of Medicine, Istanbul University. It is the first such gift to a library in another nation.

In behalf of the society and the committee, William C. Gorthy, director of the Institute for the Crippled and Disabled in New York City, presented two token volumes to Dr. Uveys Maskar, acting dean of the faculty in Istanbul, on November 20, 1958.

The token volumes, tooled, stamped, and hand-bound in fine leather by handicapped clients receiving training in the institute's vocational rehabilitation service, were Rehabilitation Center Planning, published by the Department of Health, Education, and Welfare, and Rehabilitation, A Community Challenge, by W. Scott Allan.

Correction: The editors regret the error that linked the campaign against rats in Korea, reported in February, to the typhoid fever program. The error was not the author's.

Community Responsibility for Mental Health

JOHN D. PORTERFIELD, M.D.

THE OTHER night, as bedtime literature, I resumed reading in the Evans' Dictionary of Contemporary American Usage and ran across this bit of historiography stimulated by the words "incubus" and "succubus."

"In former times," they write, "when demonology was a more exact science, an *incubus* was a male demon which haunted the sleep of women and was responsible for their bearing witches, demons, and deformed children. The innocent maiden, however, plagued by his advances could protect herself with St. Johnswort and vervain and dill. The *succubus* was the female counterpart. The offspring of the union of a man and a succubus was demonic, but the proper prayers, spells, or charms recited by the man upon awakening would prevent its conception. These distinctions no longer hold in standard common usage, but the learned preserve them and delight in them."

After twinkling briefly over the sly dig at the learned class to which the Evanses inescapably belong, I made a mental note to inquire on the following day whether St. Johnswort, vervain, or dill had any medical properties either separately or in combination, and gave a less specific instruction to my subconscious to check on modern analogues of spells and charms.

I would consider with you for a few moments this question of spells and charms and the modern counterparts in what we now call mental health.

It should be understood that I am not a psy-

chiatrist. My professional career has been devoted almost exclusively to public health administration. In my view this general term includes everything related to the establishment of communitywide health programs, of which, of course, mental health is an important component. In my pursuit of this specialty I have had a number of occasions to observe closely all of the aspects of programs for the detection, diagnosis, treatment, and prevention of mental illness and for the promotion of good mental health. Fortunately, I have been one of that growing number of people who have assailed the problem of integration of mental health and community health from both sides.

In the course of accumulating this experience I have developed some strong feelings and a few firm opinions about this matter of community mental health. From the vantage point of this experience I would like to consider a serious problem which is ours as citizens of the modern American community.

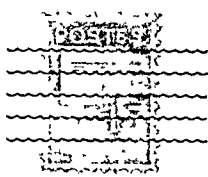
The Meaning of Mental Health

To discuss all of the bands in the spectrum of mental health would take too long. To be sure, the term "mental health" needs some definition.

We paradoxically include under this heading all the varied and difficult problems posed by mental illnesses and emotional disorders. We go quickly, sometimes too quickly, beyond this to a host of other problems perhaps because of the magnitude of the problems and the difficulties involved in attempting to develop measures to deal with them.

Beyond the frank psychoses and the psychoneuroses is a whole field of personality dis-

Dr. Porterfield is Deputy Surgeon General of the Public Health Service. This paper is based on a talk before the 27th General Assembly, Council of Jewish Federations and Welfare Funds, at the Shoreham Hotel, Washington, D. C., November 14, 1958.



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Correction: The editors regret the error that linked the campaign against rats in Korea, reported in February, to the typhoid fever program. The error was not the author's.

huge institutions, overcrowded and understaffed as they are, tend to defeat the purpose for which they were established. Leaders in the field of psychiatry have suggested that mental hospitals hold from 200 to 500 patients only. But this requires many more trained professional workers, as well as new buildings.

The relatively new idea, in this country at least, of the "open" hospital, in which patients are helped to use their own resources for independent and responsible activity, requires more than merely throwing away the keys to the doors. Custodial care is relatively simple. In an open hospital, trained people are needed to plan and conduct active treatment. We need more personnel, too, to staff the "day" hospitals, where patients who live at home can get treatment during the day, and the "night" hospitals, where patients who hold full-time jobs return for treatment at night. For these groups, as well as for recently discharged patients, there should be more halfway houses, sheltered workshops, convalescent homes, foster home care, and help with legal and personal problems. Perhaps more than anything else, a sympathetic community is needed—a community that will accept the former patient as relative, friend, neighbor, and fellow employee, without prejudice or discrimination.

But what of the problem of mental illness outside the hospital? Surveys have estimated that about 6 percent of the population, or close to 10 million people, are seriously enough disturbed to need treatment. The percentage appears to be even higher in overcrowded, economically depressed areas in some of our larger cities. It has also been estimated that 50 percent of the patients seen by general practitioners for physical complaints are suffering from some form of mental disorder, and that their complaints are at least partially psychogenic.

The magnitude of the problem of maladjustment in children, as evidenced in school problems and in a demand for outpatient clinic services that far exceeds the supply, is well known today. So is the extent of juvenile delinquency and divorce and broken homes. In addition, some 3 percent of the population, or close to 5 million individuals, are mentally retarded.

In the face of this almost overwhelming array of problems, we find ourselves singularly handicapped in terms of resources. For one thing, we are desperately short of trained, professional personnel in mental health. Surveys in different parts of the country have shown that we need 3 to 5 times as many psychiatrists and psychiatric social workers as we now have, 4 to 7 times as many psychologists, and 5 to 7 times as many psychiatric nurses.

The number of outpatient psychiatric clinics has increased considerably during the past few years. But the total number, about 1,200, only half of which operate on a full-time basis, is far short of the need. Only a handful of residences are currently available for inpatient treatment of psychotic children. The result is that these children either lack treatment or are thrown together with adult mental patients.

Search and Research

Fortunately, we are beginning to see some progress. I have already mentioned some of the recent gains in care and treatment. A great deal has also been done to help meet the need for trained personnel. During the past decade, a considerable number of psychiatrists, clinical psychologists, psychiatric nurses, and psychiatric social workers have been trained with funds made available under the National Mental Health Act. The Public Health Service's National Institute of Mental Health also provides funds to include psychiatric training in the curriculums of medical schools and collegiate schools of nursing. Research fellowships and other grants have helped to train some of the people needed to do research in mental health.

Research into the cause, treatment, and prevention of mental diseases is a long, complicated, and expensive undertaking. Here, too, the Federal Government provides support and stimulus. Investigators in research centers throughout the country are conducting a wide range of biological, psychological, and sociologic studies with Federal aid. In addition, NIMH conducts mental health research in its own laboratories and clinical facilities.

Out of this work, new knowledge is emerging about the structure and functioning of the

orders which manifest themselves in problem behavior, such as drug addiction, chronic alcoholism, delinquency, and psychosomatic illness. Mental retardation and its effects on family and community are also the concern of mental health. Over and above these, however, is a broad range of problems which have become rather loosely incorporated under the term "mental health."

This range encompasses an almost bewildering array of failures in living. Examples can be drawn from practically every area of human activity and from every one of the "ages and stages" of man's growth and development. I need not spell them out. The problems of marital adjustment and divorce, of parent-child frictions and maladjustment to school, of absenteeism and failure in work, of the older person seeking a satisfactory way of life, the generalized unhappiness of individuals and families, the failures of people to cope with the world—whether because they are too weak or the stress of circumstances too great—all of these and more are the daily problems dealt with by both health and social agencies.

Increasing emphasis on prevention has further broadened the field of mental health. Many agencies have become concerned with what is termed building "positive mental health." This is an area of much complexity and more than a little ambiguity.

Some attempt at definition was made by Dr. Marie Jahoda in a monograph, *Current Concepts of Positive Mental Health*, the first in a series of publications by the Joint Commission on Mental Illness and Health, authorized by the Congress to conduct a survey of the national mental health problem. Dr. Jahoda starts with the assumption that absence of illness and presence of health overlap, but do not necessarily coincide. She analyzes the psychological content of the various criteria that have been suggested as indicators of positive mental health. Included are attitudes of the individual toward his own self, his sense of identity, the style and degree of his growth and development, the ways in which he uses his psychological resources, his autonomy, his perception of reality, and control of his environment.

All of these concepts, together with the ques-

tion of how social adjustment can be made to coincide with individual independence and integrity, are familiar. These are the factors which all of us consider in planning a coordinated community approach to social needs.

The New Look in Care

As a physician and an administrator, however, I tend to proceed on the basis of practicality. My operational principle is that the promotion of health is tied to those preventive measures which reduce the likelihood of disease. As practical workers in community welfare services, we are vitally concerned with the prevention of mental illnesses and allied disorders. Before discussing the help we need from the community, let us look briefly at the problems we face and the gains recently made.

We are all acutely aware of the mental institutional problem in this country. Despite the fact that the population of mental hospitals has begun to decline slightly within the past year or two, some three-quarters of a million people are still confined to institutions. It has not been long since the certification of an individual for and his admission to one of these public institutions characteristically marked his permanent departure from the family and the community. The walls around these institutions were high, and the people inside, staff as well as patients, had practically no communication with the world outside.

Three things have happened to these institutions in recent years.

First, a much more dynamic program of treatment has been initiated in most of them. Such new therapies as the tranquilizer drugs, which have curbed symptoms and made patients more amenable to other types of definitive treatment, have given impetus to this program.

Second, various forces have helped to tumble down the walls, so that the institutions have become a much more active part of their communities.

Third, the communities themselves have begun to grope toward efforts at preventing or at least retarding the hospitalization of those people who show signs either of aberrant behavior or of aberrant thinking.

There are other promising developments in mental hospitalization. We are learning that

the same way that we now control tuberculosis and other diseases. Such programs become more crucial when we consider the effects of improved methods of treatment and the increased emphasis on returning partially recovered patients to the community. For example, many patients may be able to return to the community in the first year or two after hospitalization, and many may be treated on an outpatient basis without ever being hospitalized. This depends, however, on the development of community resources, which are for the most part latent or nonexistent. As we in public health view it, the mental hospital is one of a whole complex of community agencies available to deal with mental and emotional disorders. It can provide professional assistance to other agencies, but needs their assistance to carry out its own mission successfully. The new trends make the community a key factor in the management of mental illness and should dramatically sharpen community awareness of the need for effective preventive work.

What then is the community like? How is it organized and how does it function?

The basic unit, in relation to our problem, is the family. Over and over again it is said that mental health efforts need to be directed to the family—its interpersonal relations, its child-rearing practices, its external attitudes. Families can be reached in a number of ways. We know, for example, that such communication media as newspapers, magazines, radio, and television reach many families at the same time. We also know that families coalesce in neighborhood groupings and in various groups around the school, the church, health agencies, and social and work interests. We know that families need help in child rearing, and that key agencies like the school, church and synagogue, Scouts, and Y's give this help.

Our knowledge of how communities build or retard sound mental health is still inadequate. But we have enough information to warrant trying out various preventive techniques. And it seems reasonable to presume that children, and families in relation to children, would be the most productive starting point in any long-range mental health program.

Almost all children go through the school system, where there is ample opportunity to

observe and influence their behavior. If the school is well staffed and equipped, its influence can be in the direction of better mental health. Most schools examine the child's health and confer with parents regarding illness or behavior problems. Some school systems employ psychologists, social workers, and other trained personnel to help in dealing with emotional problems that can best be handled within the school setting. Anyone who has worked in schools and in parent-teacher groups has felt the great striving toward mental health which parents have for their children and for themselves. The school is a powerful focus for mental health efforts.

There are other counseling and guidance services, including the courts and welfare agencies, which should be viewed as resources for mental health work. Even more important, perhaps, for basic preventive efforts are churches and synagogues, places of work, and social and neighborhood groups.

Opinion Leaders and Caretakers

In all communities there are two overlapping groups of people, called by some the "opinion leaders" and the "caretakers," who can contribute much to mental health efforts. The opinion leaders are those whose influence molds the opinions and behavior of a great many people. Political, religious, business, and professional leaders are in this category.

The caretakers are the people who are called on in time of psychological stress, such as bereavement, illness, and changes in job or social role. These situations can be quite critical for people who may need help to function normally. Caretakers who can administer such psychological "first aid" are, among others, physicians, clergymen, police, social workers, nurses, and teachers.

If it were possible to provide some kind of mental health training for the opinion leaders and the caretakers, these key people might be able to do a more effective job. Ultimately they might create a kind of therapeutic environment in the community and spread a "contagion of health." In the long run, such environments would tend to reduce the incidence of mental illness and permit the management and treat-

brain and central nervous system, about techniques for treating the mentally ill, and about preventive measures. Special emphasis is being given to such key problems as schizophrenia, alcoholism, mental retardation, and the use of psychopharmacologic agents in treating mental disorders. In a relatively new program, the Public Health Service makes funds available for demonstrations in new methods of treating and caring for the mentally ill.

The growth of community mental health facilities represents another great area of progress. Partly as the result of Federal and State encouragement, communities have begun new programs and services. Voluntary agencies and welfare groups, at all levels, have contributed substantially to this new look at mental health services.

But the task ahead is still a staggering one. Our basic knowledge is far from complete. We are not able to apply even the limited knowledge we do have. It is not likely that we will have all the psychiatrists and other professional personnel we need for many years to come. It is fairly certain that, for a long time at any rate, we will have to "make do" with facilities that are inadequate, in terms of both quality and quantity. All of these areas point up the extent to which the entire community must be involved.

Preventive Possibilities

As a nonpsychiatrist I am afraid I must confess to you that I am rather skeptical about much of what the psychiatrists hold out as effective psychotherapy or as effective prevention. I have unfortunately seen too many instances of exclusive and complete dependence on these resources and too many failures as a result. It is my own private opinion that the ultimate solution of the problems of mental illness lie more within the realm of biochemistry and psychopharmacology. At least in therapy I consider the analyses, the psychotherapeutic interviews, and all the other current techniques to be partially effective, much in the same way that a crutch or a cane is helpful to a person with a fractured leg bone and not much more likely to produce a permanent and successful cure.

As to prevention, I must admit I am not quite so strongly biased. I can accept the analogy which describes individuals as having varying amounts of insulation or protection surrounding the development of their "normal" thought processes and their "nerves." It is quite possible that this insulation can be strengthened by the provision of a wholesome mental milieu or environment for the individual, by the removal from the environment of those toxic factors which would eat away the insulation. Hence, just as a cane or a crutch is useful in preventing a broken leg when one is not quite as steady on his feet as most people or when one is forced to tread a precarious and slippery path, so improvement of the mental environment may be of significant benefit to the borderline individual or others faced by hazards.

The path can be smoothed, straightened, and made passable. This is the job of the community and its various agencies. If you were to draw a circle around the area which contains most of the factors affecting an individual's mental health, you would probably draw the circle around his community, recognizing, of course, that there are certain regional and national forces at work too. The community is the basic element in the mental health effort and even State and national agencies work best when they work closely with community mental health groups.

In only a few communities, however, are attempts being made to do a coordinated job in spite of the fact that lack of coordination means wasted time and effort. Bradley Buell and his associates a few years ago found that 6 percent of the families in a midwestern city were utilizing more than 40 percent of the community's social and health services of all types. For years Buell and his associates have been arguing for a unified effort by community health and social agencies. They suggest that only one agency assume primary responsibility for each family which presents multiple problems, and that this agency then coordinate the services of other agencies in a well-planned rehabilitation effort. To my knowledge this approach has not yet been fully tried anywhere.

Coordinated, long-range programs are essential if we are ever to control mental illness in

the same way that we now control tuberculosis and other diseases. Such programs become more crucial when we consider the effects of improved methods of treatment and the increased emphasis on returning partially recovered patients to the community. For example, many patients may be able to return to the community in the first year or two after hospitalization, and many may be treated on an outpatient basis without ever being hospitalized. This depends, however, on the development of community resources, which are for the most part latent or nonexistent. As we in public health view it, the mental hospital is one of a whole complex of community agencies available to deal with mental and emotional disorders. It can provide professional assistance to other agencies, but needs their assistance to carry out its own mission successfully. The new trends make the community a key factor in the management of mental illness and should dramatically sharpen community awareness of the need for effective preventive work.

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ment of the less seriously ill right in the community.

Incidentally, we also need to locate the foci of infection in the community—individuals in places of influence who exercise a detrimental effect on the mental health of others. Unfortunately, these people also tend to be caretakers and opinion leaders.

Obviously, more work is needed to identify the key people in the community and to discover the type of training that is best suited for them. This approach, however, is worth pursuing. For one thing, we do not now have nor are we likely to have in the future enough professional mental health workers to do the preventive job that is needed. On the other hand, most communities contain a great reservoir of healthy, well-motivated people who are potential resources of preventive measures. These are the people who keep the wheels turning in the community and keep our complex social system working smoothly. They need to be alerted to spot incipient problems, to help prevent these problems if possible, and to handle deviant behavior in a constructive way.

We need also to deepen our understanding of the social significance of deviance. In a period of rapid change, certain kinds of non-conforming behavior are desirable. If everyone behaved according to expectations, we would very shortly stagnate. Community leaders and caretakers need to know how to deal effectively with the constructive deviant, with the gifted child or adult who can enrich our life, different though his behavior may be. Sometimes it is difficult to distinguish between such a person and someone whose behavior is likely to lead him in a vicious circle toward mental illness. The healthy community will give understanding and help to both types of deviants if it is to avoid becoming overburdened with an increasing number of frustrated, sick individuals.

The Cultural Climate

Finally, the size of the problem requires a great deal of self-help, that is, public education and guidance in sound mental health principles. Casefinding programs aimed at highlighting the individuals with specific emotional difficulties depend upon the dissemination of mental health

information and education for the community at large. Then, community mental hygiene clinics could serve as the focal points for anticipating and adjusting conflicts which may arise in normal relationships in the home, the school, and the workplace.

If the emphasis is on prevention, we can be spared from a situation such as one in Ohio where, as part of its program, the State helped support the establishment of community mental hygiene clinics. Far too often, in my opinion, the clinics, organized around a psychiatrist-director, viewed their primary function as diagnosis and therapy of mental illness on an outpatient basis. Within a matter of weeks, the directors were swamped with patients and could not accept new referrals. What is more important, they could reserve very little time for the more important job of providing psychiatric consultation to courts, welfare agencies, schools, and other agencies which deal with people and could use this kind of guidance in preventive and health promotional activities.

What we needed in Ohio—and what we need now throughout the country—are more mental health centers which are devoted exclusively to the work of prevention. Such centers are part of the community's total resources for better mental health, resources which include a great many agencies and groups. These resources need to be known, assessed, and used in a coordinated community undertaking.

I cite once again an experience in Ohio, this one in Franklin County. About a year ago the Franklin County Mental Health Association enlisted all the major elements of the community in a survey on the availability of community resources for mental health. One of the main findings of their survey report was that "good community mental hygiene is not the responsibility of specific mental health services alone, but is also a responsibility shared in part by all and especially by all agencies and individuals who work with people and provide services for people."

This, then, is our modern answer to spells and charms. It will take determination and hard work to exorcise the demons, even of our own day. But the job can be done and must be done if we are to create a healthier world for ourselves and the generations to follow.

Attrition in Psychiatric Clinics for Children

JACOB TUCKMAN, Ph.D., and MARTHA LAVELL, M.S.S.

THE PAST DECADE has seen an increase in the number of outpatient psychiatric clinics for children, yet facilities are not and may never be adequate to meet the need. Even if the necessary funds were available, recruitment of trained personnel would be difficult. Moreover, the increasing demand for psychiatric services as the public becomes more aware of their value may far outstrip future expansion of clinic facilities.

Without in any way minimizing the need for more psychiatric facilities, it may be well to ask whether present clinics are now being fully used in giving direct psychiatric services to children. There appears to be a large proportion of patients or parents acting for them who terminate contact with the clinic before service is completed. Karpe (1) reports an overall attrition rate (patient and parent termination of clinic contact) of 26 percent, and Anderson and Dean (2), of 31 percent. Simon (3) mentions a considerably higher rate, 53 percent, which is broken down into rate of termination at intake (21 percent) and during treatment (32 percent). Golden (4) reports 14 percent attrition at intake, and Gray (5) states that one third of the patients did not return after intake. Witmer (6) does not give an overall rate but mentions that more than half of the cases in treatment withdrew before service was completed.

With the exception of Anderson and Dean,

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these and other investigators (7-9), using case history data or telephone followup contact, have concerned themselves with reasons for termination or with factors associated with attrition. The factors studied have included sex, age, occupation of father, number of siblings, and distance from the clinic, as well as more subjective items such as parental attitudes toward the child or toward treatment and the ability of the parent to express anxiety.

These studies of attrition and the factors associated with it, although useful in pointing up an important problem, have certain limitations. In general, the phase of the clinic process at which attrition occurred, whether intake, diagnostic evaluation, or treatment, is not indicated. Without such a breakdown of the data, it would be difficult for clinics to focus their efforts toward remedying the situation. Moreover, factors associated with attrition may vary from phase to phase. The rationale for inclusion or exclusion of cases in computing attrition rates is not always clear nor are the samples clearly defined. For the most part, the data are based on small samples of less than 100 cases. In the studies concerned with factors associated with attrition, it is difficult to interpret the findings since the data generally have not been subjected to statistical test.

The purposes of this study, designed to avoid the limitations mentioned above, are to estimate attrition rates at each phase of the clinic process and to investigate the relationship between attrition at each phase and a number of personal and social factors. The study was conducted by the division of mental health, Philadelphia Department of Public Health, in cooperation with the health division of the Philadelphia Health and Welfare Council.

The Study Sample

During the calendar year 1955, 1,813 children were admitted to 11 of 12 children's outpatient psychiatric clinics in Philadelphia. A clinic is defined as "a psychiatric outpatient service for ambulatory patients where a psychiatrist is in attendance at regularly scheduled hours and takes the medical responsibility for all the patients in the clinic. Clinics that have only a psychiatrist on call or as a consultant are not included. However, a clinic which has budgeted funds for employing a psychiatrist but is temporarily without one is included" (10). The 11 clinics served a varied number of patients. One had an intake of more than 800; two had an intake of about 250 each; three between 100 and 150 each; and five, less than 60 each. Of the last group, two had an intake of less than 10 each. The one clinic not included in this study had a very small intake.

From this group of 1,813 admissions, which represented almost all children receiving service through public or voluntary psychiatric clinics, 1,548 were selected for study of attrition. Of the 265 cases excluded from the study, 8 were patients for whom it was not possible to determine at what phase attrition occurred and 257 were patients who had been referred for special services. Twenty-eight of the latter were referred for consultation only, that is, usually a single interview with parent or social agency on the management of a particular child, and 229 came for diagnostic evaluation only, primarily at the request of private psychiatrists or hospitals.

Of the 1,548 patients, 67 percent were boys and 33 percent, girls. Seventy-five percent were white and 22 percent, nonwhite; in 3 percent of the cases race was not stated. Ages ranged from 1 to 17 years: 14 percent were under 6, 28 percent between 6 and 8, 23 percent between 9 and 11, 23 percent between 12 and 14, and 12 percent between 15 and 17 years of age. In 33 percent of the cases, the patient came from a home broken by separation or divorce or death of one or both parents. Thirty-two percent were Protestant, 23 percent Catholic, 29 percent Jewish, and 16 percent of other or not-stated religions.

Information about the father's occupation was not available in almost half the cases. The most that can be said is that the entire range of occupations was represented and that those in the professional, managerial, and proprietary occupations were at least equal to their proportion in the general population.

Referral sources were as follows: schools, 32 percent; parents, friends, and relatives, 20 percent; private physicians, 19 percent; hospitals and clinics, 17 percent; social agencies, 7 percent; courts, 3 percent; other sources and not stated, 2 percent.

By examination of the case record including case summary or concluding interview, data were obtained regarding outcome of contact at each phase of the clinic process (intake, diagnostic evaluation, and treatment): whether the case was terminated by the patient, terminated by the clinic, or continued into the next phase.

Operationally, a case was considered terminated by the patient when evidence in the case record indicated that the patient did not return to the clinic after breaking appointments or when the patient or his parent notified the clinic that he no longer wished to continue. In a very small number of cases the patient had moved from the city, been admitted to an institution, or died.

A case was considered terminated by the clinic when the patient was discharged because he had shown sufficient improvement; when the clinic had made other plans for the child, for example, referral to appropriate agencies in the community or, on occasion, to a private psychiatrist; when clinic policy made the child no longer eligible for service because of age or school dropout, or because long-term psychotherapy was indicated which the clinic was unable to provide; or when the clinic felt that further therapy was not indicated because the patient or responsible relative was not able to benefit from continued treatment.

Results

The data on outcome of contact with the clinic (table 1) showed that 31 percent of the cases were terminated by the patient and 4 percent by the clinic during or at the end of the intake phase; in 1 percent outcome was not stated. The majority, however, 65 percent

Table 1. Outcome, in percentages, of contact for children admitted to psychiatric clinics, at each phase of clinic process, by race and sex, Philadelphia, 1955

Outcome	Intake phase							
	White		Nonwhite		Race not stated		Total group N=1,548	
	Male N=780	Female N=374	Male N=221	Female N=121	Male N=40	Female N=12		
Patient terminated.....	31	33	33	25	25	25	31	
Clinic terminated.....	3	4	4	2	3	0	4	
To diagnosis.....	65	62	62	72	68	75	65	
In process.....	0	(¹)	(¹)	0	0	0	(¹)	
Not stated.....	1	1	1	1	5	0	1	
	Diagnostic evaluation phase							
	White		Nonwhite		Race not stated		Total group N=1,000	
	Male N=509	Female N=232	Male N=136	Female N=87	Male N=27	Female N=9		
	Patient terminated.....	13	12	19	22	15	33	15
	Clinic terminated.....	9	12	10	13	26	0	11
	To therapy.....	74	70	68	60	44	44	70
	In process.....	1	(¹)	0	0	0	0	(¹)
	Not stated.....	3	5	3	6	15	22	4
		Treatment phase						
		White		Nonwhite		Race not stated		Total group N=702
		Male N=379	Female N=163	Male N=92	Female N=52	Male N=12	Female N=4	
		Patient terminated.....	45	43	33	33	50	0
Clinic terminated.....		25	28	23	36	0	25	26
In process.....		14	15	13	8	17	25	14
Not stated.....	16	13	32	23	33	50	18	

¹ Less than 0.5 percent.

(1,000 cases), moved into the diagnostic evaluation phase. Of these, 15 percent were terminated by the patient at some point in or at the completion of the diagnostic evaluation phase, while 11 percent were terminated by the clinic, and 4 percent had an unstated outcome. Again the majority, 70 percent (702 cases), moved into the treatment phase. Of these, 42 percent were terminated by the patient, and 26 percent were terminated by the clinic, 16 percent as improved, 5 percent referred to other agencies or services, and 5 percent for other reasons. The proportion of cases terminated by the

patient in the treatment phase is probably an underestimation because 14 percent were still in treatment, or awaiting treatment, and in 18 percent of the cases no information was available about outcome. Irrespective of phase, the overall attrition rate (patient or parent termination of clinic contact) was 59 percent of all clinic admissions.

The data given above for all clinics combined do not indicate the variation from clinic to clinic. Excluding clinics with an intake of less than 25 cases, the following variations were found among eight clinics. At the intake phase

the proportion of cases terminated by the patient ranged from none to 45 percent; those terminated by the clinic from none to 6 percent; and the proportion of cases that moved into the diagnostic evaluation phase ranged from 49 percent to 100 percent. At the diagnostic evaluation phase, termination by the patient varied from 2 percent to 34 percent; termination by the clinic from 2 percent to 20 percent; and the proportion that moved into the treatment phase varied from 40 percent to 96 percent. At the treatment phase patient termination varied from 10 percent to 55 percent, and clinic termination from 5 percent to 52 percent. The amount of patient termination at any one phase was not found to be significantly related to patient termination at any other phase. The attrition rate for all phases varied from 26 percent to 71 percent. The variation in attrition among the different clinics at any phase or all phases is probably due to a number of factors including type of clientele, length of waiting period, fee schedule, and clinic policy and procedure.

To determine what factors were associated with outcome of contact, comparisons were made at the intake and diagnostic evaluation phases based on the proportion of cases that were (a) continued, that is, moved into the next phase of the clinic process, (b) patient terminated, and (c) clinic terminated. In the treatment phase, comparisons were based on the proportion of cases that were patient terminated and clinic terminated. In this phase, the findings should be interpreted with caution since cases in treatment or awaiting treatment and those with unknown outcome were not included in the analysis.

Sex, race, and age were not found to be related to outcome at any phase of the clinic process, but certain other factors were significantly related: referral source, living arrangements of child, religious affiliation, number of problems presented, and distance from the clinic (table 2).

Referral source was related to outcome at the intake and diagnostic evaluation phases only. At the intake phase, referrals by social agencies and by hospitals and clinics were more likely to be continued and less likely to be patient

terminated than were referrals by other sources. At the diagnostic evaluation phase, the pattern was different. Although referrals by social agencies again showed the highest proportion in the continued and the lowest in the patient-terminated group, those by hospitals and clinics were next to the lowest in the continued and next to the highest in the patient-terminated groups. Referrals by parents, friends, and relatives, by schools, and by private physicians were among the highest in the continued and in the middle range in the patient-terminated group. Court referrals were least likely to be in the continued group and most likely to be patient terminated. Referrals by courts and by hospitals and clinics were highest in the clinic-terminated group while those by schools were the lowest.

Living arrangements of the child had a bearing on outcome of contact at the intake and treatment phases only. At the intake phase, children in institutions or foster homes were most likely to be in the continued group, whereas those in homes with a step-parent were least likely to be continued. At the treatment phase, the proportion of patient terminations was lower for children in institutions or foster homes than for those with any other living arrangement and highest for those living with relatives. The tendency for children in institutions or foster homes to carry through was not unexpected in view of the finding that social agency referrals hold up best.

Religious affiliation, studied for whites only, was associated with outcome of contact at the diagnostic evaluation phase only. A higher proportion of Jews than of Catholics or of Protestants were in the continued group; and Jewish contacts were least likely to be either patient terminated or clinic terminated.

The number of problems presented by the children, as reported usually by parents at the initial contact with the clinic, was associated with outcome of contact at each phase of the clinic process. The problems had been classified in 12 categories: anxiety and neurotic symptoms, severe psychiatric symptoms, withdrawal behavior, school problems, mental retardation, aggression, antisocial behavior, difficulties in interpersonal relationships,

Table 2. Factors associated with outcome of contact,¹ at each phase of clinic process, for children admitted to psychiatric clinics, Philadelphia, 1955

Factor	Intake				Diagnostic evaluation				Treatment		
	Number of cases	Percent			Number of cases	Percent			Number of cases	Percent	
		Continued	Patient terminated	Clinic terminated		Continued	Patient terminated	Clinic terminated		Patient terminated	Clinic terminated
Referral source:											
Parents, etc.	302	60	36	5	175	78	11	11			
Schools	488	61	36	3	290	78	18	5			
Courts	53	62	32	6	32	53	22	25			
Private physicians	293	63	32	4	177	75	15	10			
Hospitals and clinics	254	73	25	2	171	61	20	19			
Social agencies	105	82	14	4	84	83	5	12			
Other	14	64	29	7	9	78	22	0			
Living arrangements:											
Both parents	1,012	65	32	3					326	64	36
Parent and step-parent	113	51	43	5					26	65	35
One parent	262	68	26	6					80	61	39
Relatives	50	62	34	4					10	90	10
Institution or foster home	74	89	8	3					34	29	71
Religious affiliation: ²											
Protestant					147	72	14	14			
Catholic					181	70	18	12			
Jewish					288	87	8	6			
Number of problems: ³											
Less than three	888	70	27	2	590	69	19	13	258	55	45
Three or more	633	58	38	4	359	81	10	9	215	69	31
Distance from clinic: ⁴											
Near health district					295	72	16	11			
Far health district					241	85	10	5			
Same health district					65	58	25	17			
Other health district					471	81	12	7			
City resident	996	56	40	4					319	67	33
Nonresident	183	72	23	5					73	51	49

¹ Data in the table are limited to those where the differences were significant at or below the .01 level of confidence. Leaders indicate "not significant."

² Based on whites only.

³ Expressed as categories.

⁴ Based on three largest clinics.

somatic symptoms, problems of habit formation, sexual problems, and miscellaneous.

Categories of problems, not the number of problems within the category, were analyzed. For example, if poor school work, truancy, and cheating were reported for one patient, he was treated as one individual presenting a school problem. In reporting the data, number of problems refers to number of categories. At the intake phase, children with three or more problems were less likely to be in the continued and more apt to be in the patient-terminated group than were those with less than three problems. At the diagnostic evaluation phase, however, the pattern was just the opposite. At the treatment phase, children with the most

problems were more likely to be patient terminated. It is recognized that the relationship between number of problems and severity cannot be established with any degree of accuracy nor can the combinations of problems be equated. Within the limitations of the data, however, patients presumably in greater need of psychiatric help were more likely to terminate contact than those in less need of help at both the intake and treatment phases.

It has been suggested that distance from the clinic affects attendance, that is, patients who must travel long distances to the clinic are less likely to maintain contact. Such opinion is not supported by the data. If anything, the relationship is just the opposite.

To determine the effect of distance from the clinic on clinic contact, only cases from the three largest clinics were studied because of complexities of analysis. Comparisons with respect to distance from the clinic were made in three ways. The first involved a division of the cases by residence in near and far health districts. (For administrative purposes, Philadelphia is divided into 10 health districts.) "Near" refers to the health district in which the clinic was located and those contiguous to it. "Far" refers to health districts farther removed. In the second comparison patients residing in the district in which the clinic was located were compared with those in all other health districts. The third comparison involved a division of the cases by residence in or outside the city.

At the intake and the treatment phases, no difference was found between the near and the far, or between the same and the other health districts. However, at both phases, city residents were more likely to be patient terminated than were nonresidents. It should be pointed out that some areas outside the city are closer to certain clinics than are some areas within the city. At the diagnostic evaluation phase, a higher proportion of those living in near districts than of those in far districts were patient terminated; the same tendency was found for the same and the other health districts.

The findings with respect to the factors associated with outcome of contact show variation at different phases of the clinic process. This is probably due in part to the increasing homogeneity of the clinic population as it moves from one phase to another, but also to changes in the situation within the family or the clinic during the months that may elapse between the initial clinic contact and the other phases.

It is most difficult to isolate the effect of specific factors on outcome since there is interaction among some of the factors. Moreover, other factors on which no information was available may have been operating. For example, socioeconomic level was undoubtedly a factor in the relationship between outcome and distance from the clinic since children living in the farther health districts or out of the city are more likely to come from a higher

socioeconomic stratum than those living in nearer health districts or within the city.

Discussion

This study of 1,548 patients admitted to 11 psychiatric clinics for children in a large city has shown a high proportion terminating contact before service was completed, especially in the treatment phase.

Even though the patient has terminated contact he may have received some benefit, and the family may have a better understanding of his problem and how to cope with it. In some cases, in the absence of more appropriate facilities, children may be accepted for treatment because of the severity of the problem, with full recognition that certain factors militate against a successful outcome. There may also be factors not wholly within the clinic's control that affect the attrition rate. One factor undoubtedly is a limited appreciation by the public of the nature of psychiatric treatment and the amount of progress to be expected in a given period of time. When a crucial problem has been resolved to some extent, thereby reducing tensions in the home, some families may terminate contact before the clinic feels it advisable. Another factor may be the cost of clinic service, which some families may consider too high because of other pressing demands on their income.

In the light of present knowledge and the public's attitude toward psychiatry, it may be that a high attrition rate cannot be avoided. However, in the absence of adequate data such a conclusion cannot be considered valid. Although this study provides data about certain factors associated with attrition, more information, collected on a systematic basis, is needed regarding not only the personal and social characteristics of patients who terminate contact but also the more subtle motivational factors that affect clinic attendance. Research of this kind will provide the basis for further refinement of criteria for selection of patients and of procedures for reducing the attrition rate. Since the magnitude of the problem varies from phase to phase among the different clinics, each clinic needs to determine for itself, by an examination of the caseload, at what point in the process efforts should be focused.

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Trial of Drugs for Gout

Zoxazolamine is undergoing clinical trial for the treatment of gout at the National Institute of Arthritis and Metabolic Diseases, Public Health Service.

Zoxazolamine has been used for several years as a muscle relaxant. Its possibilities in the treatment of gout were noticed in studies of the drug's metabolic breakdown in the body, during which large amounts of uric acid crystals were observed in patients' urine.

The original studies were made by Dr. J. J. Burns of the National Heart Institute and research workers at the Mount Sinai and Goldwater Memorial Hospitals in New York City, under a grant from the National Institute of Arthritis and Metabolic Diseases.

Dr. J. E. Seegmiller of the institute's Arthritis and Rheumatism Branch is directing a larger and more intensive clinical trial of

zoxazolamine. To date studies have shown that the drug is approximately six times more potent than other uricosuric drugs.

Another uricosuric drug, sulfinpyrazone, is also being studied at the institute. The two drugs given together appear to produce greater uric acid excretion than either singly.

Gout affects approximately 300,000 persons in this country. Usually the first sign of this arthritic disease is excruciating pain and swelling. Attacks recur at irregular intervals.

A disturbance in body chemistry which results in an increase in the amount of uric acid in the blood and tissues is associated with both chronic gout and acute gouty arthritis. The uric acid is often deposited in cartilage, and in time the deposits grow until they form masses of chalky uric acid salts.

Use of general hospitals

Variation With Methods of Payment

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LESLIE MORGAN ABBE, B.S.

A STUDY of the use of general hospitals has included an investigation of the variation in levels of use in relation to methods of payment for hospital care and in relation to existence of prepayment coverage. This variation has also been examined in relation to selected personal and economic factors. Data were collected in September 1956 through interviews of about 27,000 households, including about 90,000 persons of all ages, drawn from the civilian noninstitutional population of each State. Selected highlights of the findings on these relationships are reported here.

From each family a history was obtained of hospitalizations during the previous 12 months. This history covered each admission of each member of the household, with length of stay, reason for admission, identification of the hospital, and method of paying the hospital bill. Since the survey was conducted in connection with the monthly Current Population Survey of the Bureau of the Census, data on selected personal characteristics were available for the

members of each household. Income data were obtained by a special question in the survey. Information was also elicited about insurance or other prepayment plans covering the cost of hospital care. This part of the interview was facilitated by a previous letter to each family asking them to be ready to supply such information.

Instructions to enumerators contained two principal definitions. The "hospital bill" was defined as "all charges made by the hospital and charges by surgeons, anesthetists, special nurses, or others engaged by the patient for service in the hospital." "Hospital prepayment coverage" was defined as including the following hospital insurance and medical care plans:

1. Commercial hospital insurance (when not limited to accidents), on either individual or group basis.
2. Blue Cross or Blue Shield plans or other nonprofit plans sponsored by medical societies, on either individual or group basis.
3. Consumer-sponsored plans (not types 1 and 2) which provide prepaid hospital care, including cooperatives and plans sponsored by fraternal organizations.
4. Industrial plans of an employer or union which provide hospital care beyond that legally required for industrial accidents.

Mr. Odoroff is chief and Mr. Abbe is assistant chief of the Program Evaluation and Reports Branch, Division of Hospital and Medical Facilities, Public Health Service.

This is the third interim report of provisional findings from a national household survey of the use of general hospitals. The first, published in the May 1957 issue of *Public Health Reports* (pp. 397-403), briefly described the survey procedure and presented findings on demographic and ecologic factors in the use of inpatient facilities. The second, published in the June 1957 issue of *Public Health Reports* (pp. 478-483), presented findings on demographic, ecologic, and economic factors in the use of outpatient facilities. Analysis and interpretation of all data and comparison with other studies will be included in a summary monograph when the tabulations are completed.

The survey is considered a first step in defining more precisely appropriate standards of need for general hospitals in the light of changing medical practice and changing patterns of care. It is expected to point the way to more intensive studies of the real need for physical facilities for adequate care of a known and described population. The survey was conducted for the Division of Hospital and Medical Facilities of the Public Health Service in September 1956 by the Bureau of the Census, in connection with its monthly Current Population Survey.

5. Other free or reduced-cost hospital plans, such as hospital employee benefits, free care for dependents of Armed Forces members, and the like.

Particular effort was made to include only insurance or plans that were general in extent and to exclude those for particular purposes or of uncertain availability. Not included as hospital prepayment coverage were (a) policies covering only accidents, "dread diseases," income lost from disability, clinic or office visits, or liability for injury to others, or (b) free hospital care for veterans in Veterans Administration hospitals.

The reports of hospitals used were screened to avoid counting time spent in long-term hospitals or nursing homes. All available inventories and registers were consulted for this purpose.

The data collected have certain limitations, since they do not cover institutional popula-

tions or persons who were hospitalized during the 12-month period but who died, moved, or entered the Armed Forces before the survey was taken. Members of the Armed Forces were not enumerated, although other persons in the same household were included. In addition, reporting and tabulating difficulties made it necessary to confine a portion of the study to persons 14 years old and over. A summary monograph, to be published after the interim reports are concluded, will contain an appraisal of under-reporting in the survey, and will also discuss measures of sampling variability and the problems of errors of response. (Some comments on these matters were included in the second interim report.)

Methods of Payment

The following four methods of payment were identified in the survey:

Prepayment plan: Any part of the hospital bill paid by hospital insurance or a medical care plan (see definitions above).

Self or relatives, or both: Any part of the hospital bill paid by the patient or his relatives, including those living outside his household.

No charge made: Free care, either in a public hospital (city, State, or Veterans Administration) or in one supported by private, charitable, or community chest funds, and including hospitalization cost paid directly by public assistance or relief agencies.

Other methods: Cost met in some way not included in first three classes, such as assistance by friends, payments by employer without any regular medical plan or under workmen's compensation, insurance payments under driver's liability when hit by automobile.

These methods occurred singly and in combination. The most frequent combination reported was that of prepayment plan plus payment by self or relatives. Other combinations were infrequent. Accordingly, hospital use has been tabulated under the four single methods of payment and also under the principal combination.

Three measures of the level of hospital use were employed throughout the study: (a) annual admissions per 1,000 population, (b) annual patient-days per 1,000 population, and (c)

Table 1. General hospital use, by age and method of payment for care

Age groups, in years	Method of payment for care					
	All methods	Prepayment plan only	Prepayment plan plus self or relatives	Self or relatives, or both	No charge	Other methods
Annual admissions per 1,000 population						
All ages.....	101	29	36	23	6	5
Under 14.....	54	20	20	10	3	3
14-24.....	119	32	32	39	8	6
25-34.....	162	50	60	37	8	7
35-44.....	109	35	44	17	6	7
45-54.....	93	26	42	13	5	7
55-64.....	104	27	42	20	8	6
65 and over.....	125	18	36	48	10	13
Annual patient-days per 1,000 population						
All ages.....	810	189	271	163	116	71
Under 14.....	279	86	82	51	36	23
14-24.....	649	174	171	169	83	50
25-34.....	991	282	357	176	115	60
35-44.....	912	252	339	115	119	87
45-54.....	926	208	388	114	119	87
55-64.....	1,331	272	490	245	234	87
65 and over.....	1,744	197	445	570	312	217
Average stay per admission, in days						
All ages.....	8.1	6.5	7.5	7.0	20.1	14.2
Under 14.....	5.2	4.4	4.2	5.2	14.6	7.7
14-24.....	5.5	5.4	5.4	4.3	9.9	8.3
25-34.....	6.1	5.7	5.9	4.8	15.4	8.6
35-44.....	8.4	7.1	7.7	6.7	20.8	12.4
45-54.....	9.9	7.9	9.2	8.7	26.6	12.4
55-64.....	12.8	10.1	11.8	12.1	30.1	14.5
65 and over.....	14.0	11.2	12.5	11.9	32.4	16.7

NOTE: Discrepancies in totals result from rounding.

average stay per admission. These measures of use have been compiled under each method of payment for care according to the patient characteristics of age, family income, and reason for admission.

Age has a considerable influence on the level of hospital use, regardless of the method of payment for care (table 1). In general, as age increases, so does the annual number of patient-days under each of the several methods of payment. However, when hospitalization is paid for by a prepayment plan alone, the rate of

patient-days reaches a peak at ages 25-34 years and then declines through ages 45-54. A new peak is reached at the ages 55-64 years, with a second decrease for persons 65 and over.

The average stay also rises steadily with age. It accelerates much more rapidly when care is free than when it is covered by any other method of payment. Free-care patients aged 55 to 64 years and those 65 and over were hospitalized for averages of 30 and 32 days per admission, or more than twice the average stay of all persons at these ages.

Table 2. General hospital use, by members of primary families,¹ by family income and method of payment for care

Family income	Method of payment for care					
	All methods	Prepayment plan only	Prepayment plan plus self or relatives	Self or relatives, or both	No charge	Other methods
Annual admissions per 1,000 population						
All incomes.....	102	30	37	23	5	5
Under \$1,000.....	84	7	13	36	13	14
\$1,000-\$1,999.....	97	15	20	36	12	13
\$2,000-\$2,999.....	110	27	30	34	10	7
\$3,000-\$3,999.....	107	35	35	25	5	6
\$4,000-\$4,999.....	103	37	45	21	2	3
\$5,000-\$7,499.....	104	36	45	16	2	3
\$7,500-\$9,999.....	91	30	44	12	3	3
\$10,000 and over.....	84	26	40	15	(²)	3
Income not reported.....	102	27	37	23	4	8
Annual patient-days per 1,000 population						
All incomes.....	768	191	273	153	85	65
Under \$1,000.....	810	41	105	346	170	145
\$1,000-\$1,999.....	964	136	153	261	212	187
\$2,000-\$2,999.....	942	201	232	208	178	72
\$3,000-\$3,999.....	810	219	253	143	119	74
\$4,000-\$4,999.....	676	226	289	105	27	29
\$5,000-\$7,499.....	700	200	321	106	31	43
\$7,500-\$9,999.....	623	192	305	76	28	22
\$10,000 and over.....	699	163	376	144	1	15
Income not reported.....	837	223	261	172	123	58
Average stay per admission, in days						
All incomes.....	7.6	6.4	7.3	6.6	16.7	13.0
Under \$1,000.....	9.6	5.7	7.9	9.5	12.9	10.3
\$1,000-\$1,999.....	9.9	9.3	7.7	7.2	17.6	14.4
\$2,000-\$2,999.....	8.6	7.5	9.3	6.2	17.8	10.3
\$3,000-\$3,999.....	7.6	6.3	7.2	5.7	23.0	12.3
\$4,000-\$4,999.....	6.2	6.2	6.4	4.9	11.5	9.7
\$5,000-\$7,499.....	6.8	5.5	7.1	6.6	12.9	14.3
\$7,500-\$9,999.....	6.8	6.4	7.0	6.5	10.0	7.1
\$10,000 and over.....	8.3	6.3	9.4	6.7	1.5	5.0
Income not reported.....	8.2	8.4	7.0	6.9	28.2	7.3

¹ Primary families include persons related by blood, marriage, or adoption (one of these being the head of the household). ² Less than 0.5.

NOTE: Discrepancies in totals result from rounding.

Family income appears also to affect the level of hospital use under each method of payment (table 2). Admissions paid for by prepayment plans rise rapidly with family income to the \$5,000 level, remain stable until the \$7,500 level, and then decline slowly. Families with in-

comes below \$1,000 pay for nearly one-half of all their admissions and patient-days through their own resources alone. Families with incomes between \$1,000 and \$3,000 have the highest rate of hospital use as measured in patient-days per year.

Table 3. General hospital use, by reason for admission and method of payment for care

Reason for admission	Method of payment for care					
	All methods	Prepayment plan only	Prepayment plan plus self or relatives	Self or relatives, or both	No charge	Other methods
Annual admissions per 1,000 population						
All reasons.....	100	29	36	23	6	
Surgery.....	25	6	11	5	2	1
Obstetrics.....	22	5	7	7	1	(¹)
Pediatrics.....	16	6	6	3	1	1
Accidents.....	6	2	1	1	(¹)	1
Other reasons.....	32	10	11	7	2	1
Annual patient-days per 1,000 population						
All reasons.....	808	188	271	163	116	71
Surgery.....	261	45	104	51	41	21
Obstetrics.....	96	25	34	29	4	4
Pediatrics.....	82	25	24	15	11	7
Accidents.....	77	20	14	14	17	12
Other reasons.....	292	73	94	54	44	27
Average stay per admission, in days						
All reasons.....	8.1	6.5	7.5	7.0	20.2	12.2
Surgery.....	10.6	7.6	9.6	10.4	26.7	14.6
Obstetrics.....	4.5	4.6	4.8	4.0	4.4	6.1
Pediatrics.....	5.2	4.4	4.2	5.2	14.6	13.1
Accidents.....	12.1	8.7	10.2	12.0	41.4	11.2
Other reasons.....	9.3	7.7	8.6	7.7	20.8	14.6

¹ Less than 0.5. NOTE: Discrepancies in totals result from rounding.

Reasons for admission, with the exception of obstetrics, seem not to have much effect on hospital use in relation to the different methods of paying for care (table 3). For obstetrical care, 30 percent of all patient-days were paid for solely by the family, as compared with 20 percent for all reasons for admission. For each reason for admission except obstetrics, average stay was less under prepayment plans, either when they were the sole method of payment or when they were supplemented by family resources, than the average stay for all persons. Average stay under free care was much longer than care covered by other methods of payment for all reasons for admission except obstetrics and "other reasons."

Prepayment Protection

As a supplement to the tabulations on methods of payment, tabulations have been developed to show contrasts in use between patients having some prepayment protection and those having none. These tabulations exclude children under the age of 14 years, for whom data were incomplete. They relate only to the population receiving hospital care, not to the population as a whole. In obtaining data on types of prepayment protection, the enumerators identified and reported only the most comprehensive plan for persons who had two or more plans.

The type of prepayment plan and the type of coverage are both related to the level of hospital use (table 4). Persons with at least some pre-

Table 4. General hospital use among persons 14 years old and older, by prepayment protection status and type of coverage

Prepayment protection status and type of coverage	Annual admissions per 1,000 population	Annual patient-days per 1,000 population	Average stay per admission, in days
All persons aged 14 and over-----	120	1,032	8.6
With prepayment protection:			
All types of protection-----	135	1,043	7.7
Hospital coverage only-----	109	982	9.0
Hospital and surgery-----	138	1,037	7.5
Other combinations-----	151	1,189	7.9
Blue Cross plans ¹ -----	135	1,131	8.4
Hospital coverage only-----	112	1,087	9.7
Hospital and surgery-----	138	1,114	8.1
Other combinations-----	159	1,524	9.6
Other plans-----	136	953	7.0
Hospital coverage only-----	103	770	7.5
Hospital and surgery-----	138	960	6.9
Other combinations-----	147	1,046	7.1
Without prepayment protection-----	93	1,013	10.8

¹ Includes Blue Shield plans.

payment protection (regardless of its comprehensiveness) make more frequent use of hospitals than those without any protection. For the population 14 years of age and over, the annual admission rate for those with prepayment protection is 135 per 1,000 population; for those without protection it is 93 per 1,000 population. Average stay per admission, however, is lower for those with protection (7.7 days) than for those without it (10.8 days). Consequently, the number of patient-days per 1,000 population is about the same for both groups.

Persons with Blue Cross protection are admitted to hospitals at the same rate as those protected under other plans. (In this study the term "Blue Cross" includes Blue Shield plans as well, and is used in referring to either type of plan or both types.) They stay considerably longer, however, and thus use more patient-days: 1,131 per 1,000 population as compared with 953.

Substantial differentials appear in the level of use as measured by annual patient-days under

Table 5. General hospital use, by prepayment protection status and age

Age groups, in years	Prepayment protection status		
	All persons	With prepayment protection	Without prepayment protection
Annual admissions per 1,000 population			
All ages-----	101	(¹) 135	(¹) 93
14 and over-----	(¹)		
Under 14-----	54	(¹)	(¹)
14-24-----	119	131	100
25-34-----	162	177	123
35-44-----	109	122	77
45-54-----	93	107	63
55-64-----	104	120	76
65 and over-----	125	154	108
Annual patient-days per 1,000 population			
All ages-----	810	(¹)	(¹)
14 and over-----	1,032	1,043	1,013
Under 14-----	279	(¹)	(¹)
14-24-----	649	666	623
25-34-----	991	1,059	825
35-44-----	912	966	775
45-54-----	926	954	865
55-65-----	1,331	1,389	1,233
65 and over-----	1,744	1,855	1,680
Average stay per admission, in days			
All ages-----	8.1	(¹)	(¹)
14 and over-----	8.6	7.7	10.8
Under 14-----	5.2	(¹)	(¹)
14-24-----	5.5	5.1	6.2
25-34-----	6.1	6.0	6.7
35-44-----	8.4	7.9	10.1
45-54-----	9.9	8.9	13.7
55-64-----	12.8	11.6	16.2
65 and over-----	14.0	12.0	15.6

¹ Data not available.

different types of coverage. The level of use was lower when prepayment protection covered hospitalization alone or hospitalization and surgery than when coverage consisted of "other combinations." Coverage for hospital and surgical costs results in a shorter average stay than does hospital coverage alone.

Table 6. General hospital use by members of primary families ¹ 14 years old and over, by family income, prepayment protection status, and type of prepayment coverage: Rates based on total population in income class

Family income	All members	Members with prepayment protection			Members without prepayment protection
		All members covered	Covered by Blue Cross ²	Covered by other plans	
Annual admissions per 1,000 population					
All incomes.....	122	90	45	45	33
Under \$1,000.....	105	25	9	16	50
\$1,000-\$1,999.....	120	58	27	31	62
\$2,000-\$2,999.....	138	85	38	46	53
\$3,000-\$3,999.....	133	98	47	51	34
\$4,000-\$4,999.....	137	113	55	58	21
\$5,000-\$7,499.....	120	104	53	51	16
\$7,500-\$9,999.....	102	88	47	42	13
\$10,000 and over.....	91	77	49	28	14
Income not reported.....	116	85	47	38	31
Annual patient-days per 1,000 population					
All incomes.....	986	679	370	309	307
Under \$1,000.....	1,047	195	104	91	552
\$1,000-\$1,999.....	1,196	472	274	198	724
\$2,000-\$2,999.....	1,249	738	398	340	511
\$3,000-\$3,999.....	1,056	748	381	367	308
\$4,000-\$4,999.....	915	751	393	358	161
\$5,000-\$7,499.....	896	767	399	368	129
\$7,500-\$9,999.....	755	653	393	259	103
\$10,000 and over.....	852	703	478	225	148
Income not reported.....	971	682	406	277	288
Average stay per admission, in days					
All incomes.....	8.1	7.6	8.3	6.9	9.4
Under \$1,000.....	9.9	7.7	11.4	5.7	10.6
\$1,000-\$1,999.....	10.0	8.2	10.3	6.4	11.7
\$2,000-\$2,999.....	9.1	8.7	10.4	7.3	9.7
\$3,000-\$3,999.....	8.0	7.6	8.0	7.2	9.0
\$4,000-\$4,999.....	6.7	6.7	7.2	6.2	6.9
\$5,000-\$7,499.....	7.5	7.4	7.6	7.2	7.9
\$7,500-\$9,999.....	7.4	7.4	8.4	6.2	7.9
\$10,000 and over.....	9.3	9.1	9.8	8.0	10.5
Income not reported.....	8.3	8.0	8.6	7.2	9.3

¹ Primary families include persons related by blood, marriage, or adoption (one of these being the head of the household).

² Includes Blue Shield plans.

NOTE: Discrepancies in totals result from rounding.

In each age group, persons with prepayment protection have a higher admission rate than do those without protection (table 5). However, their average stay is shorter, particularly in the older groups, and consequently there is less difference in the number of patient-days.

To examine hospital use rates in relation to family income and prepayment protection status, rates have been computed on two separate bases: (a) total population in each income group and (b) population in each protection status in each income group.

Table 7. General hospital use by members of primary families¹ 14 years old and over, by family income, prepayment protection status, and type of prepayment coverage: Rates based on population in each protection status in each income class

Family income	All members				Members without prepayment protection
		All members covered	Covered by Blue Cross ²	Covered by other plans	
Annual admissions per 1,000 population					
All incomes	122	137	136	139	94
Under \$1,000.....	105	127	129	126	100
\$1,000-\$1,999.....	120	166	194	148	95
\$2,000-\$2,999.....	138	170	187	159	105
\$3,000-\$3,999.....	133	150	156	145	100
\$4,000-\$4,999.....	137	152	146	158	92
\$5,000-\$7,499.....	120	129	126	132	84
\$7,500-\$9,999.....	102	107	101	115	75
\$10,000 and over.....	91	97	100	92	69
Income not reported.....	116	138	135	139	82
Annual patient-days per 1,000 population					
All incomes	986	1,040	1,125	954	885
Under \$1,000.....	1,047	982	1,466	714	1,063
\$1,000-\$1,999.....	1,196	1,364	2,001	947	1,107
\$2,000-\$2,999.....	1,249	1,486	1,946	1,165	1,016
\$3,000-\$3,999.....	1,056	1,143	1,256	1,044	892
\$4,000-\$4,999.....	915	1,015	1,049	981	630
\$5,000-\$7,499.....	896	952	952	952	663
\$7,500-\$9,999.....	755	789	845	717	595
\$10,000 and over.....	852	886	980	735	720
Income not reported.....	971	1,091	1,161	1,002	770

¹ Primary families include persons related by blood, marriage, or adoption (one of these being the head of the household).

² Includes Blue Shield plans.

The first series of rates permits study of the magnitude of the components of total use within each income group, according to prepayment status (table 6). On this basis it appears that hospital use, in patient-days, by families with low incomes (below \$2,000) is largely without protection. Families with incomes above \$4,000, on the other hand, have prepayment protection for most of their hospital use.

Table 7 permits study of the specific levels of use by families in each protection status at each income level. It shows that both admissions and patient-days are greatest for low-income families, regardless of protection status, and that they decline steadily in the middle-income and upper-income ranges. Families with incomes below \$4,000 with Blue Cross pro-

tection use hospitals at a notably higher rate than do other families in these income groups, with a maximum of 2,000 annual patient-days per 1,000 population, as compared with about 1,100 patient-days for those with other types of plans or not covered.

Summary

Data on use of general hospitals, obtained in a national household survey of about 27,000 families, with 90,000 persons of all ages, reveal the following variations with different methods of payment for care:

1. Hospital use rises rapidly with age when costs are met by a prepayment plan plus personal payments, personal payments alone, or free care, but hospitalization paid for by a pre-

payment plan alone shows no net increase in the rate of patient-days after age 34 years.

2. Patients aged 55 years and over for whom no charge is made have an average stay of 1 month, twice the average stay for all admissions.

3. Families with incomes under \$3,000 pay for about one-half of their hospital care through their own resources or else have free care.

4. When care is paid for by a prepayment plan plus family resources, annual patient-days rise as family income increases.

A comparison of hospital use with prepayment protection and use without it, for the population 14 years of age and over, shows the following highlights:

1. Prepayment protection is associated with more admissions and more patient-days per 1,000 population.

2. At all ages, persons with prepayment protection have a higher admission rate but a shorter stay than those without protection.

3. Low-income families (under \$1,000) without prepayment protection have substantially more admissions and more patient-days than do similar families with protection, while the reverse is true at higher income levels.

4. Families with incomes below \$4,000 who have Blue Cross protection use hospitals at a notably higher rate than all other families in this income range.

Selwyn D. Collins, 1891-1959

Dr. Selwyn D. Collins, on the staff of the Public Health Service since 1920, died March 24 in Boston. An innovator in public health research techniques, he was chief of the Division of Public Health Methods' Morbidity and Health Statistics Branch for nearly two decades. His work included participation in the Hagerstown Morbidity Studies, the Committee on the Costs of Medical Care, the first National Health Survey, and the survey of the Eastern Health District of Baltimore in which the Public Health Service, the Milbank Memorial Fund, Johns Hopkins University School of Hygiene and Public Health, and the Baltimore City Health Department collaborated.

In 1930 Dr. Collins began his studies of excess mortality associated with epidemics of influenza. He showed that mortality from other causes also increased during epidemics.

Beginning in 1938 Dr. Collins served on three decennial conferences for the revision of the International List of Causes of Death and assisted in developing the combined morbidity and mortality code for classification of diseases

now in use by member nations of the World Health Organization. He was chairman of the Index Subcommittee for the 1948 edition of the International Statistical Classification of Diseases, Injuries, and Causes of Death. Also, in the international field, he worked with the International Health Organization of the League of Nations and was a member of the WHO Expert Committee on Health Statistics. He was consultant on vital statistics to the occupation government in Japan, and, recently, a delegate to the Second International Statistical Congress, Bogotá, Colombia.

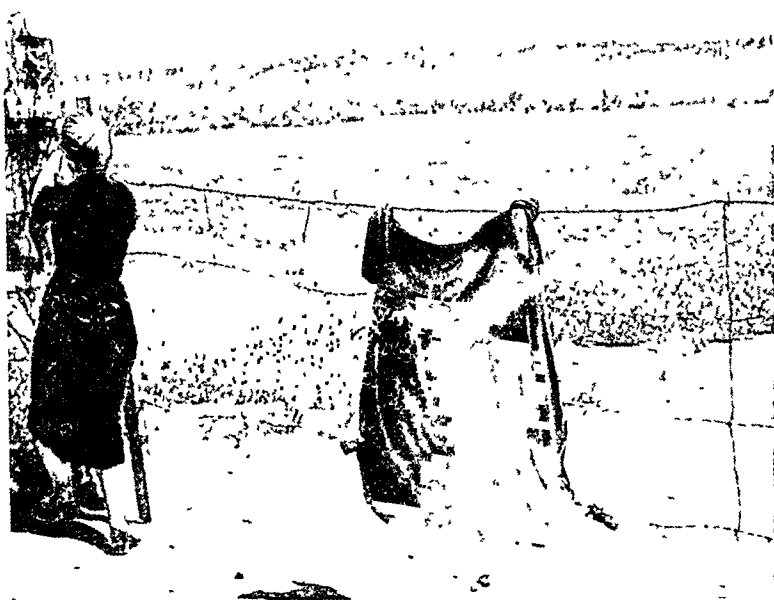
In conjunction with the editors of the 1952 edition of the Standard Nomenclature of Diseases and Operations, he directed the conversion of diagnoses to ISC categories.

A Fellow of the American Public Health Association, Dr. Collins served for 2 years as chairman of the statistics section. He was a member of the American Epidemiological Society and of the Washington Academy of Sciences.

Public Health Nursing for

MONTANA INDIANS

Two public health districts in Montana provide public health nursing services for Indian families living within the boundaries of three reservations. Under a contractual agreement between the Montana State Board of Health and the Division of Indian Health of the Public Health Service, Public Health District I (Big Horn and Rosebud Counties) at Hardin serves the Indians on the Cheyenne and Crow Reservations, and Public Health District II (Lake and Sanders Counties) at Polson serves the Flathead Reservation. Four other reservations in Montana are served directly by the Division of Indian Health.



Complicating the tasks of the local health departments are empty stretches of land and the mobility of the people. The prairies are sparsely settled, with 1 to 3 people per square mile, and crossed only by obscure trails and endless miles of fencing in which gates are invisible unless hung with an old coat or blanket (see photograph). Families migrate to higher land in summer or move in with more fortunate friends or relatives, leaving children to the care of neighbors or relatives.

The location of the homes and ranches of the Indians and non-Indians in the two districts makes cooperative health services feasible. Unlike the Navajo and other tribes who live apart

on tribal lands, Montana Indians and non-Indians in these two districts live side-by-side in the towns and on the ranch lands.

In both districts the Indians comprise substantial minorities of the total population. District I has a population of about 18,000 of whom 4,000 are Indians, and District II contains 21,000 people, including 2,000 Indians. Furthermore, Indians who receive the same kind of public health nursing services from the same agency as the rest of the citizens may be encouraged to participate in other aspects of the regular life of their communities.

The local health departments use the same personnel to serve the Indian and non-Indian

residents. The only difference is that the Indians, because of the magnitude of their health problems, require a higher ratio of personnel per population and more concentrated services. Indian health needs are estimated to be 10 to 13 times greater than those of others in the same area. Currently, each local health staff is organized to include a full-time health officer, public health nurses, sanitarians, health educators, and office clerks.

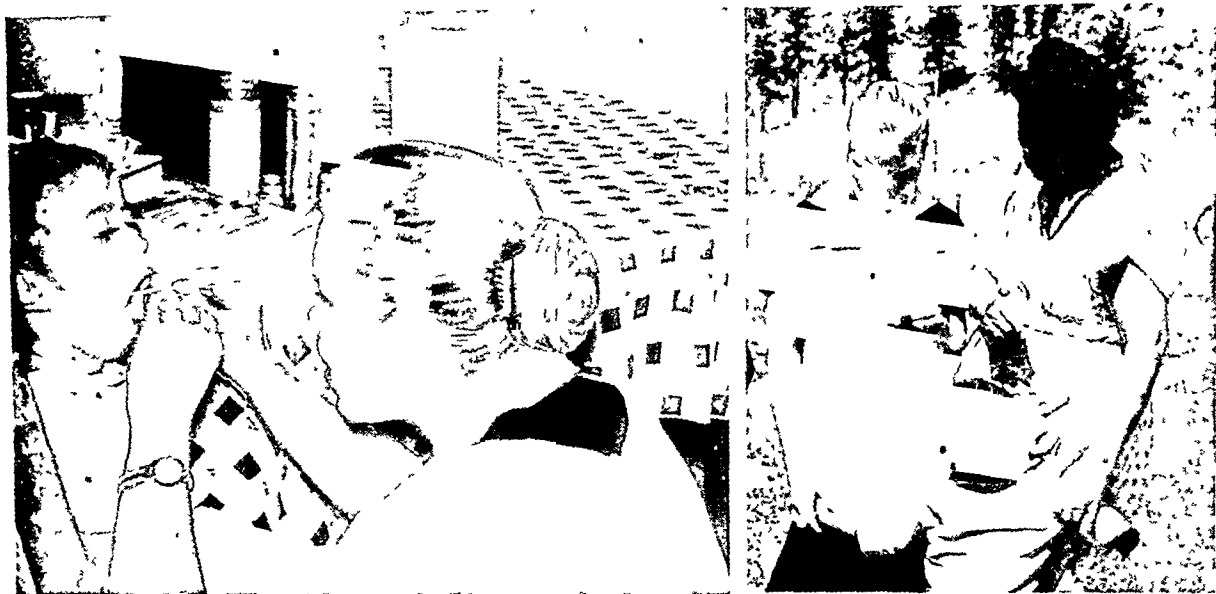
Collaborating on the picture story were these officials of the Montana State Board of Health, Helena: G. D. Carlyle Thompson, M.D., M.P.H., acting executive officer; Wava L. Dixon, director of public health nursing; and K. Elizabeth Anderson, director of public health education; and these staff members of Public Health District I: at Hardin, the late Elizabeth Bishop, M.D., M.P.H., health officer; and Doris G. Chandler, health educator, who took the photographs; and at Forsyth, Andre Pederson Gulvas, public health nurse.



Chatting with a man whose wife has tuberculosis, the nurse sets a date for his chest X-ray. The Indian death rate for the disease is high.



When a child is very ill and an isolated family cannot wait for a doctor, the nurse may give emergency service, plan for transportation, or take the family to medical or hospital care.



Left: Taking throat cultures or other evidence to a physician is part of the nurse's job in control of communicable disease. *Right:* For a sick child she improvises isolation techniques in a one-room cabin, then takes the quarantined family's grocery list to the store.



Left: On a school visit the nurse finds the slide needs repairs. *Right:* An Indian girl, torn between "living like others" and love of family, finds the nurse a friendly counselor.

Visceral and Cutaneous Larva Migrans

PAUL C. BEAVER, Ph.D.

AMONG ANIMALS in general there is a wide variety of parasitic infections in which larval stages migrate through and sometimes later reside in the tissues of the host without developing into fully mature adults. When such parasites are found in human hosts, the infection may be referred to as larva migrans although definition of this term is becoming increasingly difficult. The organisms implicated in infections of this type include certain species of arthropods, flatworms, and nematodes, but more especially the nematodes.

As generally used, the term larva migrans refers particularly to the migration of dog and cat hookworm larvae in the human skin (cutaneous larva migrans or creeping eruption) and the migration of dog and cat ascarids in the viscera (visceral larva migrans). In a still more restricted sense, the terms cutaneous larva migrans and visceral larva migrans are sometimes used to denote the formation of lesions due to a particular species of larva known or presumed to be the one most commonly involved: *Ancylostoma braziliense* in the skin, and *Toxocara canis* in the viscera. This usage of the terms is incorrect, however, since, as previously emphasized, the character and location of the lesions and the resultant symptoms are unreliable clues in the specific identification of the causative organisms (1).

Development of Concepts

The various groups and species of worms involved in the larva migrans type of infection, the clinical features of the diseases caused by them, and certain biological aspects of the host-parasite relationships have been discussed in a number of recent reports and reviews (2-5).

In the development of our concepts of larva migrans there have been four major steps. The first, of course, was the discovery by Kirby-Smith and his associates some 30 years ago of nematode larvae in the skin of patients with creeping eruption in Jacksonville, Fla. (6). This was followed immediately by experimental proof by numerous workers that the larvae of *A. braziliense* readily penetrate the human skin and produce severe, typical creeping eruption.

From a practical point of view these demonstrations were perhaps too conclusive in that they encouraged the impression that *A. braziliense* was the only cause of creeping eruption, and detracted from equally conclusive demonstrations that other species of nematode larvae have the ability to produce similarly the progressive linear lesions characteristic of creeping eruption. While in the initial studies by Kirby-Smith it was possible to demonstrate larvae in 10 percent of the skin biopsies from individuals with creeping eruption, no spontaneous case of cutaneous larva migrans has yet been given a specific etiological diagnosis; that is, no larvae have been identified in human skin.

For many years after it was shown that nematode larvae cause creeping eruption it was assumed that the apparently aimless migration was due to abnormal host-parasite relationships and that the larvae eventually perished and

Dr. Beaver is professor of parasitology, department of tropical medicine and public health, Tulane University School of Medicine, New Orleans, La. This paper was presented at the Communicable Disease Center's Conference for Teachers of Veterinary Public Health and Preventive Medicine, and Public Health Workers, Atlanta, Ga., June 12-18, 1958.

were destroyed in the skin. Two significant early observations argued against that view. Wright and Gold's finding of pulmonary infiltrations during or following the active phase of creeping eruption suggested that at least some of the larvae succeeded in making the normal migration to the lungs (7). It was also noted, however, that the pulmonary infiltrations could have resulted from the larvae without their having left the skin. Evidence of a more convincing nature was provided by the report of an authenticated intestinal infection of *A. braziliense* in a boy in Texas (8). If adults could be found in the intestine, the larvae must have migrated from the skin through the lungs enroute to the intestine. That record is no longer accepted, however, and the reports of intestinal infections of *A. braziliense* in man in other parts of the world have likewise been rendered doubtful by the observations that a morphologically very similar species, *Ancylostoma ceylonicum*, formerly regarded as a synonym of *A. braziliense*, is a valid species (9). An observation by Muhleisen was, therefore, of special significance (10). For a period of 24 days he found large numbers of larvae in the sputum of a man with severe and extensive skin lesions, leaving no doubt about migration from the skin to the lungs. Unfortunately the larvae were not identified, but it was determined without any doubt that a mature intestinal infection did not develop in this case.

Second Step

The second major event in the study of larva migrans came in 1952 with the discovery and identification of *T. canis* larvae in liver biopsies from children with a common disease which up to that time had been given a number of different names but was of unknown etiology (11). This was followed a year later by an experimental demonstration of the etiological role of *T. canis* (12) and by numerous confirmatory reports indicating that this common ascarid of dogs is responsible for much illness in children here and in other parts of the world and that it apparently is an occasional cause of death (13).

Biopsy and autopsy studies in children, and various types of studies in experimental ani-

mals have provided more interesting facts about *T. canis* as a cause of the visceral type of larva migrans than can be mentioned here.

Briefly, it has been established that infection is acquired by ingesting soil previously contaminated by infected dogs. Eggs passed in the feces, under favorable conditions in the soil, become infective in 2 to 3 weeks, containing second-stage larvae which, when taken into the intestine of a child, erupt from the egg, penetrate the intestinal wall, and soon reach the liver. A majority of the larvae may remain in the liver but others pass on to the lungs and to other parts of the body. Larvae have been found in nearly all organs. It is of chief interest that a high proportion of them invade the central nervous system and a considerable number have been found in the eye. The tragic consequence of invasion of the eye is the development of a lesion which by its resemblance to retinoblastoma prompts the unnecessary removal of that vital organ.

Although most of the larvae eventually come to rest in one location and stimulate fibrous encapsulation, there is a period of at least several weeks during which they move about in the tissues of the visceral organs in much the same manner as hookworm larvae migrate in the skin, leaving in their wake long trails of inflammatory and eosinophilic granulomatous reactions.

Thus in comparison with their microscopic size the wandering larvae produce large and extensive lesions that can be readily seen with the unaided eye in and on the surface of the liver and, at times, in other organs, especially the brain. This is the type of infection now called visceral larva migrans. Its most prominent clinical feature is high, stable, and persistent, eosinophilia, not uncommonly reaching levels suggestive of eosinophilic leukemia. Less outstanding and less constant features are enlargement of the liver, hyperglobulinemia, intermittent fever, infiltrations of the lungs, neurological symptoms, and deviations in behavior.

Thus far *T. canis* is the only species of larva identified in cases of visceral larva migrans. However, there is a good experimental and epidemiological basis for suspecting other species to be similarly involved. *Toxocara cati*, as common or more so in cats as *T. canis* is in

dogs, should occasionally reach the tissues of children. In one instance a larva in a child's liver has been questionably identified as *T. cati* (14).

Greatest anticipation of early incrimination is with *Ancylostoma caninum*. This worm is more common in dogs than *T. canis*, and occurs in cats as well as dogs. Whereas *T. canis* is relatively uncommon in older dogs and is especially uncommon in sexually mature females, *A. caninum* is found in both dogs and cats at all ages. Both parasites take full advantage of prenatal infection in maintaining a high level of endemicity and both are known to persist in the tissue of experimental animals for more than a year. There is no apparent reason why the larvae of *A. caninum* should not be found in the tissues of children along with the *Toxocara* species. However, further studies may bring to light an explanation which is presently not apparent. Larvae entering the body through the skin are less apt to be found in the liver and it is probable that *A. caninum* larvae are much less frequently ingested than the eggs of *Toxocara* and some of the other helminths.

The searching of liver biopsies for *Toxocara* larvae has in recent years uncovered three cases of *Capillaria hepatica* which formerly was found only at autopsy and was thought to be rare in man. It is hoped that when nematode larvae are encountered in the examination of human tissues it will not be assumed on circumstantial evidence that they are any particular species but rather will be identified on the basis of characteristic morphology.

Third Step

The third notable contribution to our knowledge of larva migrans came from a series of studies on the basic life cycle patterns among the ascarids. Sprent (15) summarized these studies and pointed out that while infections by some and perhaps most of those species adapted to carnivorous land mammals can be transferred from host to host in the same manner as *Ascaris lumbricoides*, that is, by ingestion of infective eggs in contaminated soil, the usual pattern under natural conditions includes intermediate or transport hosts.

Originally our domesticated dogs and cats

may have acquired their ascarid and perhaps some of their hookworm infections not directly from the soil but indirectly by eating other mammals which by feeding on the ground had earlier picked up the infective stages, preserved or further incubated them in their tissues, and passed them on to their predators.

Experimentally, *T. canis*, *T. cati*, and *A. caninum* can be transferred to their final host by first inoculating mice or other small mammals which are then after several days, weeks, or months fed to dogs or cats. The significance of such observations is immediately apparent. They point out that our previous interpretation of larva migrans caused by these species was essentially incorrect. The migration and persistence without development in human tissues are not, as we had supposed, basically due to an abnormal host relationship. We may still regard man as an abnormal host for the adult stage, and an unnatural host for the larvae in that he provides no advantage for the parasite as a species, but the behavior of the larvae in man being the same as in natural transport hosts apparently is not abnormal. It is then to be expected that any of the larval stages of nematode parasites of wild or domesticated carnivorous animals adapted to the use of mammalian intermediate or transport hosts may grasp the opportunity to enter the tissues of human hosts and await, unsuccessfully of course, the transfer to a predator final host.

It is obvious from these remarks that detailed studies on the life cycles of all worm parasites of animals having contact with humans have great usefulness in the study of larva migrans and other zoonotic helminthiases.

Fourth Step

The fourth major advance in larva migrans research was Nichols' demonstration of the feasibility of identifying nematode larvae in microsections of tissues (16,17). These classic morphological studies, while limited to only a half dozen species considered most likely to be encountered in human tissues, left no doubt that descriptions of these and other species could be sufficiently detailed to permit reliable identification often when only fragments of the larvae are available for study. The interpretation,

prevention, and effective control of any parasitic disease are, of course, dependent upon the accurate identification of the organism which causes it. To make this possible, additional studies such as Nichols' are needed.

Research on Prevalence

Inasmuch as public health programs place strong emphasis on the reliable determination of disease prevalence and on the development of preventive measures, we should mention here two additional phases of research in which recent studies show promise of providing important, useful information.

Thus far it has not been possible to get a clear picture of either the extent or the prevalence of visceral larva migrans. Originally, diagnosis was based on liver biopsies taken by laparotomy. This procedure is too hazardous and expensive to be used routinely. Furthermore, no specific therapy is available, and usually when additional infection can be prevented, the prognosis is favorable. It is understandable, therefore, that a clinical diagnosis, unconfirmed by actual identification of the causative organism, is relied upon in the management of most cases. It is equally understandable that unconfirmed clinical diagnoses are not really satisfactory.

In view of these circumstances, it is of great interest that promising and already somewhat useful serologic techniques of diagnosis are being developed by Sadun and associates (18), Kagan (19), and Jung and Pacheco (20). The fault in serodiagnostic methods has been their lack of specificity due to cross-reacting antigen-antibody systems among related worms. By fractionation and purification of antigens, cross-absorption of antibodies, and application of the recently developed hemagglutination and flocculation tests apparently reliable diagnoses are now being obtained.

With the recognition that dog and cat parasites cause obscure, serious disease in humans, surveys to determine the geographic distribution and prevalence of individual species have taken on new significance. Among the first to recognize this and to carry out a thorough and meaningful survey of dog parasites were Donaldson and his associates (21) and Ehrenford (22).

Ehrenford has given at least a partial answer to one of the first and most significant questions asked about *T. canis*. Recognizing that pups are more often infected than adult dogs the question is often raised as to the actual risk with older dogs. Ehrenford's answer is that the risk depends upon the sex of the dog. Males are about as frequently infected as pups but the incidence among females is lower at all ages and is markedly lower in the mature adult. In Indiana and adjacent States less than 5 percent of mature females were found to be infected, while almost a third of the mature males were passing *Toxocara* eggs that might eventually be the cause of illness in children. These data were obtained from stray, uncared for, unwanted dogs, as has been the case in almost all published surveys.

Studies in New Orleans indicate that although the rate of infection among well cared for dogs is relatively much lower, it still is disturbingly high. Among 171 fresh dog stools collected along the sidewalks in front of houses of perhaps the most sanitation-minded, hygiene-conscious, and economically most favored families in the city, 7 percent contained *T. canis* eggs; hookworm eggs were found in 51 percent, and *Trichuris* in 25 percent. Almost all of these stools were judged to have come from adult dogs.

Also in New Orleans, among 103 immature and 222 mature dogs brought to veterinarians for various services, all relatively expensive (indicating the owners' concern for their well-being), *Toxocara* was found in approximately 15 percent of the young dogs and 3 percent of the older ones (23). Relatively few of the dogs of either age group were presented specifically for anthelmintic treatment. Nearly half of them harbored hookworms and one-fifth had *Trichuris* infections.

Conclusion

There is much needed information to be derived from good surveys and epidemiological studies of intestinal parasites of dogs and cats. To be of greatest usefulness such studies should be carried out with the same careful preparation and epidemiological forethought and purpose as would be acceptable in a study of hu-

dogs, should occasionally reach the tissues of children. In one instance a larva in a child's liver has been questionably identified as *T. cati* (14).

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Considering the Aged

A. L. CHAPMAN, M.D.

MANY institutions and many programs are feeling the pinch of greater and greater demands on their facilities by older people. At the Peter Bent Brigham Hospital in Boston, for example, 7 percent of the patients during 1913-18 were 61 years of age or older as compared with 20 percent for the 1938-43 period. At present, the ratio is well above 20 percent and may approach 30 percent. Unpublished records from the Massachusetts General Hospital in Boston, as another example, show that the average age for all medical admissions, excluding pediatrics, rose from 35 years in 1912 to 60 years in 1949.

In the visiting nurse programs, too, the case-load has become increasingly weighted with older and chronically ill persons. Some estimate that approximately 50 percent of the visiting nurses' time is spent with these patients.

In a rehabilitation clinic for the crippled and handicapped, my final example, the ratio of approximately 5 children to 1 adult a few years ago is now nearly reversed.

It is not surprising, therefore, that anyone engaged in public health work or private medical care finds himself a practicing gerontologist. The public health practitioner, more than ever, must be prepared and willing to accept the new responsibilities imposed on him by an aging population and to find new ways of working with other professions concerned with the same problem.

Dr. Chapman, an Assistant Surgeon General, is chief of the Division of Special Health Services, Public Health Service. This article is based on a lecture given at the Summer Institute in Social Gerontology, held at the University of Connecticut in Storrs, August 28, 1953.

The seeds of chronic illness are planted early in life, perhaps before birth, necessitating a continuum of services throughout life, from infancy on, and not abruptly at the onset of old age, when chronic illness is most prevalent. The multiplicity of services and organized community efforts required by patients with chronic illness makes the health of older people everybody's business. To provide effective community response to the increased importance of socioeconomic factors, the resources of many agencies and people need to be pooled. Of course, the demands of the chronically ill and aged are in competition with other insistent matters such as radiological health, air pollution control, accident prevention, and the traditional concerns of the community. Thus, consideration of the older person's needs must be balanced with the needs of all members of the community, regardless of age or status.

Control of Chronic Disease

Many public health officials prefer the term "control" to "prevention" when speaking of chronic disease, primarily because of the broader implications of control. Control of chronic disease has been described as the maximum application of existing knowledge and resources to reduce the impact of chronic disease on the individual, his family, and society.

This concept may be considered in the light of five levels of control proposed by Dr. Hugh R. Leavell and Dr. E. Gurney Clark: health promotion, specific protection (primary prevention), early recognition and prompt treatment (secondary prevention), limiting the extent of disability, and rehabilitation.

Obviously, a community program meeting all these needs is an idealistic goal, but a synthesis

man disease. In fact such studies can be regarded as being directly concerned with human disease. We are only beginning to appreciate the importance of including household pets in the total picture of the family's and the public's health.

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Second National Conference on World Health

The Second National Conference on World Health will be held in Washington, D.C., May 7-9, 1959, under the sponsorship of the National Citizens Committee for the World Health Organization. Conference chairman will be Dr. Milton S. Eisenhower, president of the Johns Hopkins University. Topics include prospects for the International Health Year; health and population changes; health and the American image abroad; and training and exchange programs for public health personnel.

cern to public health workers: (a) the personality of the older person, (b) his social and cultural background, (c) his economic status and ability to pay for services, (d) the attitude and orientation of the community, its leaders, and professional groups, and (e) the availability of community resources and services.

As people age, they become less and less like other people of the same age. They become individualists, and treating them as a homogeneous group becomes more and more difficult. Any health program that depends on a mass approach must take account of this fact. Older people have participated only to a limited extent in community X-ray surveys, multiple screening clinics, and mass immunization programs for poliomyelitis. Even when specialized geriatric programs have been established in hospital outpatient departments, the response has not been enthusiastic. It is as if the older person views these events as further attempts to isolate him, and the belief outweighs the advantages he may see in preferred treatment.

Social isolation of many aging people is a factor closely related to their failure to participate in community programs. The loss of job, spouse, family, and friends, and the gradual restriction of social activities may very well mean infrequent and brief contact with those who remain.

Education aimed at social or cultural groups in schools, industry, service organizations, or elsewhere will not reach many of these people. In fact, the educational media of radio, television, newspapers, and other printed materials may also fail in their goals because of this isolation. How can health services and programs be "sold" to the individual whose main contact with the outside world is a monthly check from the Social Security Administration, an infrequent visit from a welfare worker, or an occasional, superficial exchange of conversation with local trades people?

Chronic illness and its restrictions upon activity add to social attrition and accentuate, furthermore, the defeatist attitude of the older person and of society as a whole. The attitude of "why bother" when one is old, sick, and alone can lead to a failure of, or lack of interest in, rehabilitation activities for older people. Since the goals of rehabilitation for this group are,

for the most part, no more than self-care or activities of daily life, not full employment, the professional worker and older person may become disinterested and apathetic. Rehabilitation is hard work and the measurement of clear-cut results is often difficult.

Of importance, too, is the attitude of aging people toward preventive medicine. They have been reluctant to participate, as mentioned before, in many different kinds of preventive programs. Surely, their attitude is more than simply not wanting to bother; the feeling may spring from deep rooted fears of not wanting to borrow trouble: "What I don't know won't hurt me." Then, too, the past and present are more important to the older person than the future, so that health measures taken today for the future prevention of disease and disability have little meaning to him.

Prepaid health insurance plans for this age group may be the best solution, but the task of "selling" such plans is an additional burden.

Care for the Older Person

The emphasis on youth and work in America undoubtedly has had a bearing not only on the pattern with which health services have developed but, as has been indicated, on the use of these services as well. In addition, industrialization, a mobile population, and the dwindling size of families and of living accommodations have created a demand for new services and programs for older people and yet at the same time have proved a deterrent to these services.

To illustrate the increasing demands for specialized services, let us consider the phenomenal growth of nursing homes in the past decade or so. At present, an estimated 300,000 aged persons are being cared for in some 25,000 nursing homes and related facilities, where, for the chronically ill, nursing care is the predominant need. The demand for such institutional care is still growing, but many older people still remain in general and special hospitals, particularly mental institutions; adequate nursing homes cannot be found for them.

It is obviously a problem with both qualitative and quantitative aspects. Qualitative control of nursing homes by licensure, inspection, and establishing standards has become predominantly a public health function. A tre-

of services at each level would produce a comprehensive program. As the center core of health and medical services for the older person develops, other agencies and personnel will be found contiguous to the core and influencing the health of the individual. Basic planning for health must include, therefore, cooperative action in housing, employment, recreation, and education.

What are the activities which might be performed on each of the five levels of chronic disease control?

Health Promotion

Health promotion encompasses all educational activities which teach people how to maintain and improve their health. For the health agency, this means providing information on diet, rest, recreation, sound personal habits, and the availability of community resources in times of health and illness.

In promoting health, of greatest importance is the need to eliminate prejudices that are all too prevalent among the families of older people, professional groups, and among older people themselves.

Specific Protection

Primary prevention is more commonly practiced in communicable disease, the occurrence of which may be averted through immunization or isolation, than in chronic disease, knowledge about which is insufficient to permit specific protection except in certain instances. Among these instances, one may point out the possibility of industry's preventing occupational cancer through the removal of carcinogenic substances in the environment and the possibility of preventing accidents, particularly in the older age group and in the home, by a variety of measures. If the relationship is firmly established between smoking and lung cancer and between fats and cholesterol in the etiology of atherosclerosis, then specific protection may be equally applicable here.

Secondary Prevention

Of utmost importance at present for the control of chronic disease is the detection of a disease in an early stage and prompt treatment to check its progress and to retard any ensuing disability.

Widespread secondary prevention of chronic disease has been witnessed in the past few years. Single and multiple mass screening programs and periodic health appraisals in the offices of physicians, in hospitals, and in industrial clinics have given promise of providing an important wedge in the control of chronic disease.

Based on the concept of the well child conference, which places children under medical supervision while they are still well, a new development in geriatrics is taking hold. This is the well oldsters conference to which apparently well older people may come for counseling, guidance, health appraisal, and referral to medical care services when necessary.

Limiting Disability

When a disease is clinically advanced or is incurable, other measures must be taken. The services for the aged or chronically ill which attempt to limit the extent of disability cover a broad spectrum of medical and nursing care. To meet the ideal of comprehensive care, the patient would be cared for in his home, in outpatient clinics, physicians' offices, general and special hospitals, nursing homes, and homes for the aged.

Rehabilitation

Services to restore an individual's physical, mental, social, and vocational state as completely as possible may be found in such diverse places as a nursing home, hospital, or large metropolitan rehabilitation center. Many kinds of services are offered, such as physical and occupational therapy, medical and nursing care, and the adjuncts of vocational guidance and counseling, social service, and sheltered or homebound work opportunities. Thus, at the level of rehabilitation, perhaps more than at any of the other four levels, the active participation of a multidiscipline team is essential to effective operation.

Deterrents to Programing

For the most part, the deterrents to a community health program for the chronically ill and aged are socioeconomic, and may appear among any of the following, which are of con-

clinical and pathological aspects of aging. Public health workers who would help these people conserve their health cannot, therefore, ignore the older person's requirements in food, clothing, and shelter. Nor can public health workers ignore the interdependence of health and leisure, employment, and social relationships. It follows, therefore, that to obtain optimum adult hygiene, the disciplines of medicine, public health, and the social sciences must be called on for help.

Training and Education

The fact that public health workers have, without any directed change of policy, found themselves working with older people entails training the health specialist so that he may have the necessary knowledge and skill to perform his new responsibilities capably.

Training in chronic disease and aging is needed at two levels: formal, long-term courses for professional workers prior to their entrance into public health, and short-term refresher or "re-tread" courses for those already in the field.

A recent study of the curriculum of schools of public health revealed that a surprising amount of time (indeed, a continually increasing amount of time) was spent in lectures, seminars, field visits, and student assignments on chronic disease and aging. Professional training is exposing public health workers to basic concepts and problems relating to the chronically ill and aged person.

Short-term training is gaining momentum, also. Large numbers of professional, semi-professional, and lay persons have availed

themselves of refresher courses, seminars, institutes, inservice training courses, and the like. These activities have brought to the participants new skills and knowledge, but more important they have stimulated interest and provided an impetus to community programming.

Need for Research

In describing the impact of aging on health programs, I have hopefully indicated, perhaps indirectly, where gaps exist. The social scientist may help fill in these gaps through research. Health workers, in order to develop sounder programs for the older person, need more information on (a) the attitudes of the community, professional workers, and the elderly on aging and programs for aging persons, (b) the reasons behind the use or nonuse of community health facilities, (c) the relationship of health and illness to work, leisure time activities, and attitudes toward others, (d) the important factors that motivate older persons to seek rehabilitation, and (e) the barriers and incentives to good community planning.

Changes have taken place that necessitate a fresh approach to the solution of the ever-increasing problem of an aging population. We in public health feel that this is one of the most important tasks confronting us today. Experimentation with new techniques and the application of present knowledge are not enough. Our ultimate goal cannot be reached without the strength and support of further research. And that goal will be reached when, through comprehensive community planning, we succeed in enriching the later years as we have extended them.

mendous task remains to be done to provide an adequate number of good nursing homes, well equipped and fully staffed with competent help. Licensure is not enough. Steps must also be taken to recruit and train nursing home personnel and to educate the community with regard to these needs.

The solution of the nursing home problem will not end the struggle of caring for the chronically ill and aged person. As a matter of fact, some 80 percent of the more than 2 million aged who were disabled for 3 months or more last year were cared for in their own homes. For those older persons living with spouse or relatives or with adequate resources for supervision, care in the home may not have been too difficult. But for the large numbers of older men and women living alone in inadequate quarters and with no one to assist them, home care is impractical however desirable. Organized home care programs are finding that these individuals need more than the medical and nursing care that they get in the home; they need homemaker or housekeeping services as well.

Homemaker services originated as a stopgap measure to prevent the dissolution of a family by providing a substitute parent during periods of disaster and stress. Like so many other programs, it was thus directed primarily toward children and their care.

In the past few years, however, there is increased awareness that other persons, primarily the chronically ill and older person, need these services. Some homemaker programs are attempting to meet these needs, but demand exceeds present capacities.

The goal of caring for the older person in his own home is obviously not easily achieved. The growth of home care and homemaker services is an essential part of the comprehensive program of care, but other means must be sought, such as foster home placement or the development of new facilities for graduated and selective care tailored to the immediate needs of each patient.

The Public Health Service is currently studying such a facility at the Manchester Memorial Hospital in Connecticut, which is providing care: (a) for the critically ill patient, (b) for those not dangerously ill, and

(c) for those who are ambulatory and capable of self-care. An adjoining unit provides long-term care, and home care has also begun.

Another step toward better care of the home-bound patient, in this instance the stroke victim, has recently been taken by the Public Health Service. Many patients who have suffered strokes may either never be admitted to a hospital for care or, if they are, are discharged to a nursing home. Because members of the family are ignorant of how to prevent deformity and disability, they and professional personnel alike have watched helplessly as many victims of stroke have become permanently crippled and bedridden. Early ambulation of the stroke victim and active and passive exercises are means by which disability may be limited, and members of the family may aid the patient in these respects, thus saving the time of professional workers.

To aid in the limitation of disability, the Chronic Disease Program of the Public Health Service has prepared a booklet entitled "Strike Back at Stroke." Based on the family physician's prescription, it is an illustrated instruction manual for the stroke victim's family to assist them in his care.

Thus we find new programs developing as the result of socioeconomic changes, programs that are based on the premise that the most logical and acceptable place for the care of the older person is in his own home. In addition to those described above, there are other community programs such as "Meals on Wheels" (which has aptly been called the "Bicycle Built for Stew"), which serves hot, nutritious meals in the homes of older persons incapable of preparing their own meals.

Recent studies in urban communities have shown that homebound older patients would prefer assistance with simpler tasks, such as marketing and personal errands, or companionship, to meals served at home. The need for some degree of independence is still felt by older persons, regardless of the extent of their handicap or capabilities. The need for friendly visiting programs or housekeeping services therefore becomes more apparent.

Many activities, we see, not usually considered a part of public health are relevant to the health of older people and extend beyond the

In this country, most biological research is conducted in universities as an adjunct of teaching; the Soviets conduct most research in research institutions. Here, when an investigator assumes administrative or political duties, he usually discontinues scholarly research. In the Soviet research institutions, it is assumed that the administrative directors will continue their studies and that facilities will be provided to the extent they are available. For example, Pavlovsky, the father of Russian zoology, continues to publish reports of his new research although he has many official duties and is well advanced in years.

It is almost impossible for a Soviet scientist to comprehend the character of an American university or the procedures by which our research is financed. When I told my hosts that Tulane was a private institution, they assumed it was dedicated to profits, or that it returned a profit to the people who financed it, or that, since it was supported by gifts, it was a charity school for the poor.

Their ignorance of American institutions appeared to be a product of their specialized education, rather than a lack of curiosity or freedom of inquiry. So far as I could observe, they seemed relaxed in their attitudes and were willing to discuss any subject. Despite such events as Pasternak's refusal of the Nobel Prize, they appear to feel we exaggerate conditions there. Among the men I met was a geneticist who told me with some scorn that he was one of several reported by the American press as liquidated for opposition to Lysenko. During the period of his supposed suppression, he said he had published several major papers on genetics.

I was also assured repeatedly that Communist Party membership is not a factor in determining promotions in research institutes. A candidate, the term used for a predoctoral worker, is at first assigned duties according to the needs of his supervisors, but as he demonstrates a capacity for original investigation, he is given free rein and promotions according to the professional appraisal by his colleagues. On the other hand, on an occasion when I was admonishing my hosts that scientists must not behave like politicians. I was told that nearly

half of the scientists in the immediate gathering were members of the Communist Party. "We are not like politicians," my informant emphasized. "We are politicians."

Opportunities for Research

Research academies of the constituent Republics of the Soviet Union appear to be free to develop their own programs. They are not subordinate to the All-Union Academy, but the work of all academies is coordinated by a separate council. I am under the impression that each Republic finances its own research institutes and that they are under no other restraint as to the direction of their activities.

The institutions were adequately but not elaborately equipped. One celebrated institution I visited at Irkutsk on Lake Baikal is housed in a small wooden structure, with cubbyholes for individual investigators. In construction at this station, however, is a collection of brick buildings, scheduled for completion next year, to house the International Limnological Institute. One of the buildings is a dormitory planned for the use of scientists from other lands. Directors of the institute said they would like to have Americans and others come to work there for 6-month terms.

Typically, it did not occur to the Soviet scientists that an American might find it difficult to raise the money for such a stay. They are not even aware that some Americans have found it difficult to travel as they wish in the U.S.S.R., although they do know and deeply resent restrictions that have been placed on Soviet visitors to the United States. Their resentment is the stronger because many wish to come here on scientific missions.

Conclusions

From my conversations and observations, it appears that if we continue to expand present programs to send well-informed scientists from the United States for consultation with their Soviet colleagues, they would certainly be effective in improving Soviet understanding and respect for this country. Moreover, since the Soviet scientist has a direct voice in government decisions, the influence of American visitors could come to be felt in the highest political circles. It is recognized that such visitors need

Scientific Exchange

FRED R. CAGLE, Ph.D.

Specific steps for strengthening American science in relation to science in the U.S.S.R. are advocated by Professor Fred Cagle, chairman of the department of zoology, Tulane University, after 40 days of consultations with scientists in research institutes in the Soviet Union. Cagle visited Soviet centers in behalf of the American Institute of Biological Sciences. The following text is based upon informal remarks by Cagle in Washington, D.C., December 17, 1958. A formal report of this mission was published in the Bulletin of the American Institute of Biological Sciences, January 1959, pp. 16-20.

AFTER intense preparations, I went to Russia confident that I knew a great deal about the country. I returned aware mainly of my vast ignorance. As a scientist, what I learned was gratifying. As an American, I also found it frightening.

Although in many respects Russian biological sciences are less advanced than ours, the rate of progress is such that in a few years ours can easily be surpassed.

Science Carries Weight

I was particularly impressed with the influence that scientists enjoy in their government. Many of them have a status and responsibility comparable to that of a Senator or Congressman in this country. One of the botanists I met impressed me particularly by the intelligence of her questions about America. For this reason, I inquired about her and learned that she was a deputy president of one chamber of the Supreme Soviet.

Scientists, I was told, do not merely advise or recommend but actually plan the studies which should be carried on in connection with such public projects as, say, a new reservoir. And in pursuing such studies, which aim primarily at practical applications, as does most Soviet

science, it appears that they also provide for basic research. Like us, Soviet scientists wish to answer fundamental questions as well as the immediate ones.

Eager to Exchange

Soviet scientists are eager for us to know what they are doing. Repeatedly they expressed irritation to me because we do not read their literature. Although they do not understand why we do not learn Russian, they have published many of their papers with both Russian and English titles and with abstracts or summaries in English. With some encouragement from us, they would certainly do more to make their papers available in English.

They tend to publish their more valuable papers as monographs, for which they are well paid, rather than in serial journals. So it becomes necessary for us to learn not only what is available in their literature but also how to appraise it. Several scientists expressed amazement that we had bothered to translate some of the Russian works which we have put into English, and on the other hand they could not understand why we had ignored certain important biological studies.

Ignorance of America

Learned though they are in their sciences, the Soviet scholars are remarkably ill-informed about American scientific institutions and their operations. To illustrate the contrasting customs: When an American requests a Russian publication from a Soviet scientist, the book is procured and mailed at government expense; but when a Russian puts such a request to an American university professor, the book is sent as a courtesy, often at considerable personal expense.

In this country, most biological research is conducted in universities as an adjunct of teaching; the Soviets conduct most research in research institutions. Here, when an investigator assumes administrative or political duties, he usually discontinues scholarly research. In the Soviet research institutions, it is assumed that the administrative directors will continue their studies and that facilities will be provided to the extent they are available. For example, Pavlovsky, the father of Russian zoology, continues to publish reports of his new research although he has many official duties and is well advanced in years.

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to be well informed, and should be well briefed in advance. I found also it was quite helpful to have personal letters of introduction wherever I visited. As many Russians speak English, the language barrier is not overwhelming, but it is nevertheless an incalculable asset for the visitor to know the language of the host country, if only as a matter of good will.

Another means we may use to inform Soviet scientists about the United States is to publish, in our scientific journals, essays which comment upon and explain some of the complexities of our society. We can also expand our exchange of journals. The scientific libraries of the various Republics are usually inadequate and they would like to exchange with us. It would not

be difficult to prepare a list of libraries which wish to share in such an exchange.

To encourage the publication in English of abstracts of Russian papers, we might reciprocate by publishing Russian language abstracts of important American contributions. We also need to make a more systematic effort to study, appraise, and collect Russian biological literature, as a phase of the current Russian translation program.

In my judgment, we should send more biologists to work in the U.S.S.R. At present there is only one biologist on the staff of our Embassy in Moscow. Strong representation there, I feel, could do much to inform Soviet scientists about American scientists and their work

Results of a Survey on Hearing Loss in Children

Only 15 to 20 percent of the school children with known hearing losses are receiving any kind of educational help, according to the findings of the Committee for Hearing Conservation, American Public Health Association.

The committee, after 3½ years of study, conservatively estimates that 5 percent (1,790,176) of the total school population would fail group hearing tests, and, of these, 39 percent (698,168) would be expected to have true hearing losses.

The study, which was co-sponsored by the American School Health Association, covered 1,362 communities in 48 States. Of these communities, 39 administered only one test during the school life of their children, and 7 of these did not begin testing until the seventh grade. Another 15 communities, which gave two or three tests, also began testing in the seventh grade or later. Yet research clearly indicates that the best preventive work is done when hearing losses are detected early and referred for medical help. By the time a child reaches the seventh grade, hearing loss may

be irreversible. Furthermore, if irreversible cases are found early enough, proper education and treatment would promote better adjustment and learning.

The study also revealed that there is no uniform program in the United States for detecting hearing losses in school children. Some areas have a program that is considered very satisfactory, but others have no program at all.

Moreover, there is no uniformity in the criteria used in determining failure on any of the audiometric tests, in the administration of tests, in referral for treatment, in notifying parents, or in the kind of treatment and education given.

Dr. C. Adele Brown, chairman of the Committee for Hearing Conservation, and director of school health services, Oswego, N.Y., reported these findings. Other members of the committee were Dr. L. M. DiCarlo, Dr. I. P. Barrett, Dr. M. E. Doster, Dr. C. D. O'Connor, Dr. C. N. Brownsberger, Dr. A. Yankauer, and T. J. LePine.

Employees' Health Insurance Program of New York State

EDWARD D. MEACHAM, M.S.P.A.

IN 1955, Governor Averell Harriman requested the president of the New York State Civil Service Commission to survey the status of fringe benefits for State employees. The survey was made by the department of civil service and submitted to the State budget director in October 1955. Chief among the recommendations resulting from the survey was that the State should provide some kind of health insurance coverage for its employees. This recommendation was based in part on findings that State employees were generally less favorably treated in this area than were employees of industrial and commercial enterprises. Also, it was felt that this particular type of employee benefit would meet a real employee need and would benefit the State as well.

During the 1956 session of the State legislature, several bills proposed some kind of health insurance coverage for State employees. One of these bills was introduced at the request of the State administration. Another bill was introduced by a State senator whose Joint Legislative Committee on Health Insurance Plans had been studying the general subject of health insurance coverage for some time. Still other bills were introduced under other sponsorship.

What finally emerged was a bill to add article VII to the New York State Civil Service Law. This bill was signed into law by Governor Harriman as chapter 461 of the New York State Laws of 1956. It provided for the creation of a Temporary Health Insurance Board and au-

thorized the president of the New York State Civil Service Commission to "establish a health insurance plan for State officers and employees and their dependents" and "to purchase a contract or contracts to provide the benefits under the plan" The law stated the general character of the plan as follows:

The health insurance plan shall be designed by the president, with the approval of the board, (a) to provide a reasonable relationship between the hospital, surgical, and medical benefits to be included, and the expected distribution of expenses of each such type to be incurred by the covered employees and dependents, and (b) to include reasonable controls, which may include deductible and reinsurance provisions applicable to some or all of the benefits, to reduce unnecessary utilization of the various hospital, surgical, and medical services to be provided and to provide reasonable assurance of stability in future years of the plan, and (c) to provide benefits on a nondiscriminatory basis to the extent possible to active members throughout the State, wherever located.

The statute prohibited coverage of certain kinds of expenses and placed a limit on the State contribution toward the cost of the insurance. Among the kinds of expenses excluded are expenses for dental care and treatment, eye glasses and hearing aids, cosmetic surgery, treatment for illness or injury arising out of employment and covered under workmen's compensation, services received in a United States Government hospital for which no charge is made, and expenses to the extent of benefits provided under any other employer group plan.

Mr. Meacham is director of personnel services, New York State Department of Civil Service.

The law also provided that coverage could be continued after an employee retires from State service. And it provided that any contracts purchased by the president of the civil service commission were to be subject to approval by the Temporary Health Insurance Board.

The Temporary Board

The Temporary Health Insurance Board, appointed pursuant to the provisions of the statute, consisted of four members appointed by the Governor, two members appointed by the temporary president of the senate, and two members by the speaker of the assembly. The board first met in June 1956.

Since the responsibility for the development of the program rested with the president of the civil service commission, staff work for the board was assigned to the personnel services division of the department of civil service.

While chapter 461 provided that the plan should be designed by the president of the civil service commission, it was his opinion that the board should cooperate in its development in order to expedite approval. The board agreed that it should develop its own specifications rather than purchase an existing "package" plan from a carrier.

Members of the staff submitted to the board comparative information on benefits under several large plans. The staff also submitted a statement of a comprehensive plan for board discussion. Since the board could not agree on this type of program, it was decided to set forth in detail the kinds of benefits which could be agreed to as essential to any well-rounded health insurance program. The descriptions of these various benefits became the preliminary specifications which were ultimately submitted to several carriers.

At this time it became evident that it would be desirable to have the advice and assistance of technically qualified personnel from the various carriers. A Technical Advisory Committee consisting of representatives of the Blue Cross and Blue Shield plans in New York State and of the insurance industry was appointed. During the course of the early deliberations of the board and the Technical Advisory Com-

mittee, the opinions of several employee groups were obtained.

To aid the board in estimating the probable cost of the program, the members of the Technical Advisory Committee submitted estimates of costs on a unit basis for each of the benefits under consideration. (One set of estimates was submitted by representatives of Blue Cross-Blue Shield and a separate set by representatives of the commercial insurance companies.) With this information, the board was able to discuss more realistically the kind of program it could construct within the fiscal limitations established by law and by State fiscal authorities.

Characteristics and Specifications

While information on the benefit program was being developed, the staff compiled data on group characteristics which would be essential if the proposals of the carriers were to be realistic. Information was included on the age distribution of State employees, the number of male and female employees, the salary distribution for these employees, the age, number, and sex of retired employees, the number of employees living in the various geographic areas of the State, and other related information.

In connection with this phase of the program, the State health department, in cooperation with the staff of the department of civil service, surveyed by questionnaire some 3,000 State employees to determine the extent of their present health insurance coverage and to learn their desires as to the kind of program they felt the State should adopt. The department of audit and control, through the New York State Employees' Retirement System, also made available a considerable amount of information with respect to the coverage group.

To maintain flexibility with respect to adoption of the final plan, the board agreed that the specifications should include eight alternatives in addition to the basic specification. These alternatives had to do with immediate coverage of maternity care, physicians' attendance in the hospital, use of an initial amount of payment (deductible) in connection with basic hospital, basic surgical, and in-hospital coverage, private duty nursing service, amount of obstetrical indemnity, and conversion privilege.

These specifications were approved by the board early in 1957, and the following few weeks were spent in developing forms and other materials to be sent to carriers with invitations to submit proposals. Although the board was not required, under chapter 461 of the New York State Laws of 1956, to get competitive bids, nevertheless it was deemed desirable to obtain proposals from as many different carriers as cared to submit them. Invitations were sent to approximately 50 insurance companies and nonprofit medical or hospital service corporations. The materials included with the invitation were:

1. The description of benefits.
2. A statewide fee schedule for surgery, radiation therapy, and physicians' attendance in the hospital for medical care. (The statewide schedule was essentially the same as that used in the Medicare program in New York State.)
3. An area fee schedule for surgery, radiation therapy, and in-hospital medical care. (The area fee schedules used were those of the Blue Shield plans operating in New York State.)
4. A schedule for obstetrical services.
5. State employee population characteristics.
6. Distribution of State employees by age and sex.
7. Distribution of State employees by salary levels.
8. Distribution of State employees by county of residence.
9. Distribution of retired State employees by age.
10. Instructions for submitting premium or subscription charges.
11. A list of eight questions relating to conditions applicable to providing services and benefits.
12. Forms to be used in submitting proposals and in estimating costs and retentions for a 10-year period.

The carriers were asked in submitting their proposals to show separate figures for active employees and for "future retired" employees. In each case, they were asked to show separate figures for part I, hospitalization benefits, part II, basic surgical, radiation therapy, and in-hospital benefits, and part III, major medical expense benefits. They were also asked to show a composite cost per employee based on a distribu-

tion of 35 percent individual coverage and 65 percent individual and dependent (family) coverage. The carriers were requested to show the total first-year premium cost for 70,000 active employees and 450 retired employees. They were requested also to show a separate figure for maternity costs if no waiting period was imposed for the charter group. Finally, the carriers were requested to show a 10th-year premium, again based on 70,000 active employees, but with 7,200 retired employees to be covered during the 10th year. (It was recognized that the figure, 70,000 actives, for the 10th year was not realistic since it did not anticipate any increase in the size of the employee group. It did illustrate the effect of expected higher costs as more employees reached retirement age.)

In estimating retentions, the carriers were requested to show for each of the first 10 years the premium or subscription charge, rate credits, dividend or retroactive credits, net costs, incurred claims, and total returns and retentions, including taxes, expenses, and reserves. Retentions were to be based on an assumption of incurred claims of 85 percent under part I, 85 percent under part II, and 75 percent under part III, and also for incurred claims of 75 percent on part I, 75 percent on part II, and 70 percent on part III.

Proposals of Carriers

The specifications were mailed on February 28, 1957, and the carriers were asked to return their proposals to the department of civil service not later than March 29. Representatives of the carriers were invited to be present when the proposals were opened.

Eleven carriers submitted proposals on one or more parts of the program. At this point, it was determined that the department of civil service should have the assistance of consultants in the insurance field to help analyze the proposals. The chief actuary of the Insurance Department of New York State prepared an analysis and report, including recommendations, on the proposals. The department also obtained the services of an insurance consultant who also analyzed the proposals and submitted a report to the president of the civil service commission.

Representatives of the staff, together with the consultants, then met informally with representatives of six of the carriers whose proposals were deemed best. At these conferences, the carriers' representatives were asked to explain in greater detail various aspects of their proposals and were questioned by the consultants and by staff members. Subsequently, the reports were turned over to the Temporary Health Insurance Board. The six carriers were given the opportunity to appear before the board to describe and support further their respective proposals. Members of the board were given the opportunity to question each of the carriers' representatives.

Following the presentations by the carriers' representatives, the board, with the two consultants present, discussed the proposals. After lengthy deliberation, the board decided to negotiate with the Blue Cross corporations of New York State for the part I hospitalization benefits, with the Blue Shield corporations of New York State for the part II surgical, radiation therapy, and in-hospital benefits, and with the Metropolitan Life Insurance Company for the part III major medical expense insurance benefits.

The contracts with these carriers were to constitute what subsequently became the "statewide plan" for which all State employees were eligible. The board also approved two optional plans, both of which carried the basic hospitalization coverage provided through the Blue Cross plans of New York State, but which in other respects differed from the statewide plan. One of these options was the Group Health Insurance, Inc., and the other, the Health Insurance Plan of Greater New York.

The board approved the program in June 1957, and the contracts providing for coverage were completed in August.

Enrollment

At this point, so as to inform prospective enrollees, it became necessary to fix a date on which coverage was to begin. This date had to be fixed sufficiently far in advance to permit the preparation of literature and the organization and the carrying out of an adequate educational and enrollment campaign.

The development of the necessary descriptive literature was a difficult task. In any program in which there is more than one carrier, care must be exercised to insure that the plan is described accurately and fairly, especially if employees are to have options. Two different booklets and two different enrollment forms were issued to prevent confusing the employees unnecessarily. One booklet described the statewide plan and the two options; the other described only the statewide plan, since this booklet was to be used in those areas where only the statewide plan would be available.

Enrollment of not less than 75 percent of the eligible employees was required under the terms of the contracts. It was estimated that, to achieve this percentage, 3 to 4 weeks of intensive enrollment would be required. Basically, the educational program was decentralized to the various departments and agencies of the State government. In order to do this, it was necessary to hold intensive training sessions for those who would conduct the employee meetings. The first session was of 3 days' duration and was limited to training personnel who were well acquainted with the techniques of presenting material to groups of employees. This group needed only to be instructed in the details of the health insurance program. The other sessions lasted 5 days and included not only details of the program but also techniques of presentation. Each department or agency sent one or more representatives to a training session; these trained individuals then returned to the agency to conduct employee meetings.

In the department of mental hygiene, with its 25 institutions and some 30,000 employees, the presentations were made by staff members of the health insurance unit in the department of civil service. Booklets and enrollment forms were distributed by the agencies, and educational material was made available through the employees' press and through the *State Personnel News*, a publication of the department of civil service which reaches all employees.

The fact that a number of employees working in State hospitals receive a considerable amount of medical care without charge tended to affect enrollment adversely. Also many State employees already had coverage through a spouse who worked in an industrial or commercial

establishment. The effectiveness of the enrollment program, however, was attested to by an original enrollment of more than 73,000 employees, which was in excess of the 75 percent required.

The plan went into effect on December 5, 1957. During the first 6 months, more than 25,000 claims were presented. It has not been possible as yet to analyze these claims in detail to determine incidence of various types of illnesses, number of hospital admissions, average length of hospital stay, and other similar information. The claim figures cited above do not include claims under the GHI option nor do they cover services under the HIP option.

Summary of Benefits

While it is not appropriate here to describe in detail the plans, a summary of the benefits will provide a general understanding of the program.

The statewide plan consists of the three parts mentioned previously. Hospitalization benefits are provided under part I. Benefits for surgery, radiation therapy, anesthesiology, obstetrics, and in-hospital medical care are provided under part II. Part III covers major medical expense benefits, including a wide range of medical care expenses divided generally into (a) extensions of the benefits provided under parts I and II and (b) benefits for certain services not covered under parts I and II.

The statewide plan and the two options provide the same basic hospitalization benefits, which include:

1. A total of 120 days' room and board charges at the semiprivate accommodation rate. (If a private room is occupied, the benefit allowed equals the charge most common for a semiprivate room.)

2. All hospital diagnostic and therapeutic services.

3. Maternity benefits of flat amounts.

4. Emergency outpatient services for treatment of injuries arising from accidents or for emergency surgery if given not later than the day following the accident.

The contract provides for hospitalization benefits for pulmonary tuberculosis and for mental or nervous disorders, but the benefit in

such cases is limited to 30 days in a general or public hospital rather than 120 days.

Maternity care under part I and obstetrical benefits under part II total \$150 for normal delivery, \$175 for cesarian section or ectopic pregnancy, and \$50 for a miscarriage. In the \$150 indemnity for a normal delivery, \$75 is paid through Blue Cross under part I, and \$75 through Blue Shield under part II (or \$87.50 each for cesarian section and ectopic pregnancy, and \$25 each for a miscarriage). If, in a normal delivery, the amount under part I should be only \$60, then Blue Shield could pay the difference between this amount and \$150, or \$90. The same relationship exists between benefits under part I and part II in the payments for cesarian section and miscarriage.

The part II benefits, as well as the benefits under part I, may be extended by the major medical expense portion of the program, part III. If, for example, the benefits for surgery under part II fail to meet the entire cost, the excess cost is subject to reimbursement under part III. An illustration of how part III extends the benefits of part I is the case of the person who stays in the hospital for more than 120 days. Under the major medical expense program, benefits are provided for these additional days. In addition, part III of the program covers such services as private duty nursing, drugs and pharmaceuticals, rental of durable equipment, prosthetic appliances, and local professional ambulance services. These latter services are generally not covered under part I or part II of the statewide plan.

Benefits under part III are subject to an initial charge, or "deductible," of \$50 for each covered individual in each calendar year. Total benefits under parts I, II, and III of the statewide plan are limited to \$7,500 in any one year and \$15,000 in a lifetime, with reinstatement permitted under certain conditions after benefits of \$1,000 have been paid.

The GHI option covers general medical care, care of allergies, surgery, consultations, in-hospital medical care, maternity care, diagnostic laboratory procedures and diagnostic X-rays, and visiting nurse service.

The HIP option provides for general, medical, surgical, and obstetrical care, laboratory and diagnostic procedures, periodic health ex-

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participate in the program. Under this change (chapter 950 of the Laws of 1958) there are several specific requirements for participation. The local subdivision must elect to participate, and its participation must be approved by the Temporary Health Insurance Board. It must pay the same rate of contribution as is paid by the State. The local subdivision is also required to pay its proportionate share of expenses of administering the plan as determined by the board. Finally, the local subdivision must agree to make its employment and payroll records available for inspection by the board.

In the present program approximately 88,000 employees are covered. With their dependents, the number covered is in excess of 200,000. If the total potential of the local subdivisions is realized, there would be an employee group of approximately 300,000 and a total coverage group of 850,000 to 900,000 persons. In addition, the present 12 employer participants would increase to more than 5,000. It is not anticipated, however, that all local subdivisions will participate, or that all of the employees in those subdivisions which do participate will enroll in the plan. Nevertheless, the coverage group will be one of the largest covered by a single set of contracts.

Before concluding, a word about administration is appropriate. The central administration of the health insurance program is the responsibility of the department of civil service. The health insurance unit of this department generally performs the following functions: maintains records of enrollment and status, certifies eligibility for benefits, interprets contracts when carrier disagrees, receives

money and pays premiums to the carriers, and evaluates the program. The State's departments and agencies enroll employees in the plan and aid employees in filing claims. They also make the necessary employer certification with respect to workmen's compensation cases.

Benefits provided through the Blue Cross plans and through the Blue Shield plans do not require submission by the employee of a claim form. This is true also of benefits provided under the HIP option. Claims for benefits under the major medical expense portion of the statewide plan are prepared by the employee and submitted to the Metropolitan Life Insurance Company through the personnel office in his agency. The claim form is accompanied by a worksheet also prepared by the employee. This worksheet itemizes expenses and includes space for the employee to indicate the total amount of benefits claimed. The employee may obtain assistance from his personnel office in preparing the worksheet if he wishes to do so. The claim form and worksheet are reviewed by the carrier and a check in the proper amount is sent to the employee through his agency's personnel office.

Under the GHI option, the employee has the doctor complete the appropriate section of the form. Then the employee completes the subscriber's portion and forwards it directly to Group Health Insurance, Inc.

Although there have been many administrative and other problems in connection with the program during the early months of its operation, there is widespread agreement that the plan is doing a good job for the employees at a reasonable cost to them and to the State.

Nuclear Medicine

A unit to study long-range effects of nuclear energy on public health has been established at the University of Chicago School of Medicine, supported in part by the Rockefeller Foundation.

The section on nuclear medicine will explore such matters as the increase in sources of public exposure to radiation, the consequences of increased exposure, control of factors responsible, medicolegal aspects of injury and compensation, and psychological reactions of society to threatening aspects of nuclear energy.

aminations and immunizations, physical therapy, visiting nurse service, and ambulance service.

The statewide plan is available to all State employees regardless of where they work or live. The GHI option is available in the counties of Albany, Bronx, Columbia, Delaware, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Suffolk, Ulster, and Westchester. The HIP option is available only to those in the Bronx, Columbia, Kings, Nassau, New York, Queens, Richmond, Suffolk, and Westchester. (In Columbia, Nassau, Suffolk, and Westchester, the program is not available to all residents of the counties but only to those in areas served by the medical groups.)

Other Features of the Plan

Some other general features of the plan deserve mention. The employee may continue his coverage after he retires provided he has at least 5 years of State service and has participated in the plan the required length of time during his years of active service. The employee continues to pay his share of the cost of coverage after his retirement. Another feature is that benefits can be made available for services given either within or outside New York State.

We should also note the "service" feature of the plan which, under certain conditions, assures enrollees that the benefit will not be less than the charge made for the service. Under part II of the statewide plan, eligibility for "service benefits" depends on the employee's income status and his use of a participating physician. Under the GHI option, the employee must use a participating physician and, for covered services given in a hospital, must not apply for or use a private room if he is to be eligible for "service benefits." Under the HIP option, "service benefits" are available if the services are obtained from the medical group in which the employee participates.

Costs and Coverage

A word about costs. Under the statewide plan, the employee who buys coverage only for himself pays one-half of the cost and the State pays one-half. If he purchases coverage for

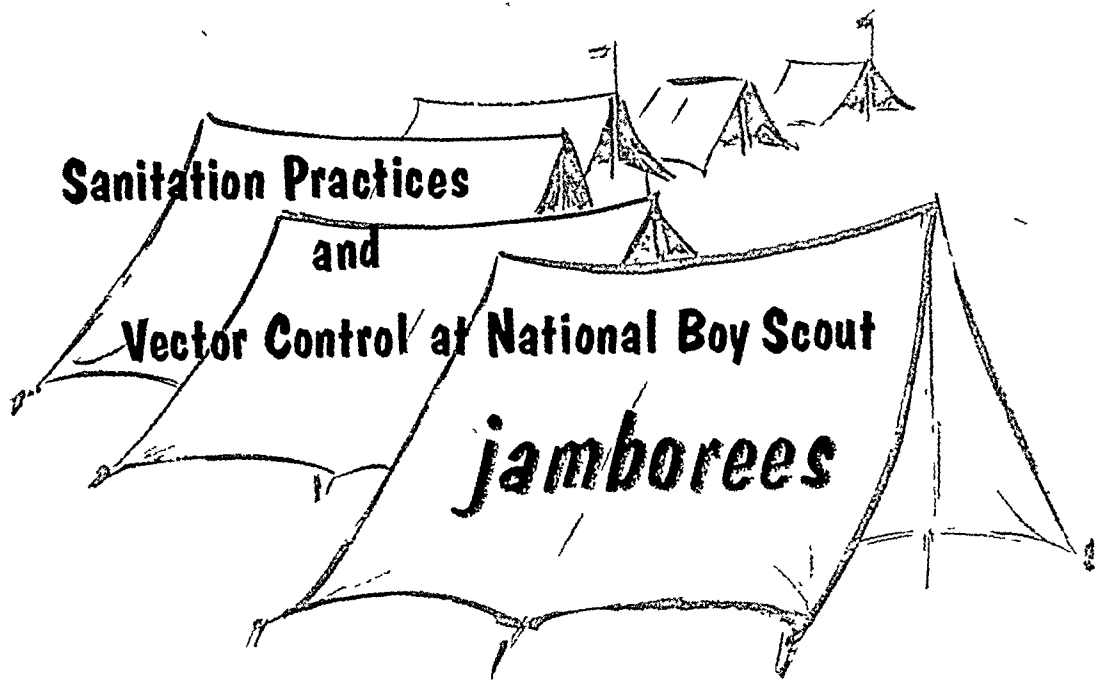
himself and his dependents, the State again pays one-half of the cost for the employee's coverage and also pays 35 percent of the cost of covering his dependents. For the current contract year, the employee who covers only himself pays \$1.42 each biweekly payroll period and the State pays \$1.42. If the employee has family coverage, he pays \$4.38 each biweekly pay period and the State pays \$3.01. (Coverage costs more under the GHI and HIP options than under the statewide plan, and since the State contribution is the same as under the statewide plan, the employee's cost is necessarily higher under the two options. For example, the cost of individual coverage under the GHI option is \$2.07 for the employee and \$1.42 for the State, and under the HIP option, \$1.94 for the employee and \$1.42 for the State.)

Chapter 461 states that the health insurance contracts should provide health insurance "for retired State employees and their spouses and dependent children . . . on such terms as the Board may deem appropriate. . . ." As indicated previously, the coverage of active employees who meet the required conditions can be continued after their retirement. To provide coverage for former employees who retired prior to December 5, 1957, the date when the program for the active employees began, the contracts were amended in March 1958. The plan for retired employees embodied in the amendment included only the benefits of parts I and II of the plan for active employees. It did not include the major medical benefits which constitute part III, nor did it make available the GHI and HIP options.

This plan went into effect on July 1, 1958, with approximately 5,600 retired employees enrolled. The retired employee's share of the cost is deducted from his retirement allowance. In order to be eligible to participate, the retired employee must belong to one of six retirement systems maintained and operated by New York State.

A Change in the Law

At the 1958 session of the legislature, a change was made in the original health insurance law to permit local government units in New York State, except New York City, to



CLYDE F. FEHN, M.S., and DARRELL R. MADDOCK, M.S.

EFFECTIVE vector control and sanitation practices permitted large, transient populations attending the 13-day National Boy Scout Jamborees to live, eat, and sleep outdoors free of annoyance from flies and mosquitoes.

Experience gained at the 1953 jamboree in Orange County, Calif., attended by 43,000, and at the 1957 event, in Valley Forge State Park, Pa., attended by 51,000, can be applied to other mass gatherings, such as recreational, educational, and religious encampments, and used in civil defense planning and in natural disasters.

Mr. Fehn is a sanitary engineer and Mr. Maddock is a medical entomologist with the Technical Development Laboratories, Communicable Disease Center, Public Health Service, at Savannah, Ga.

In cooperation with environmental sanitation personnel of State and local health departments, Mr. Fehn was responsible for vector control and related operations at the 1953 and 1957 National Boy Scout Jamborees. Both authors were assigned by the Public Health Service to the Boy Scouts of America for this task.

Both Boy Scout jamboree camps were located in suburban areas near large cities. The Scouts attending were grouped in sections, 36 at the California encampment and 38 at the Pennsylvania one. Each section included approximately 34 troops, and each troop, 4 patrols. A patrol consisted of nine boys and an adult leader.

Each patrol cooked its meals on charcoal grills and used paper plates and other paper items for food service. Every section had a tent commissary for the storage and distribution of food and used three walk-in electric refrigerators, each with a capacity of 150 cubic feet. Camp leaders, firemen, policemen, and maintenance men ate at large tent-covered messes. Each camp had five trading posts equipped with hamburger grills and milk and soft drink dispensing units.

At both jamborees some houseflies from the surrounding areas were attracted to the trading posts and large messes. Only the trading posts in California were screened. Eating sites of patrols were free from flies except in a few

publications

Highlights of the National Conference on Air Pollution, 1958. *PHS Publication No. 618; 1958; 42 pages; 35 cents.*

A summary of the National Air Pollution Conference held in Washington, D.C., in November 1958, this booklet contains a digest of the six discussion sessions and a full report of the recommendations resulting from those sessions.

The topics covered were extent and sources of air pollution; its health, economic, and social effects; and methods, procedures, and administrative aspects of air pollution control.

Included also are excerpts of statements by Secretary of Health, Education, and Welfare Arthur S. Flemming, Surgeon General Leroy E. Burney, and Senator Thomas H. Kuchel, who introduced the first Federal air pollution control legislation in 1955.

Homemaker Services in the United States, 1958.

A nationwide study. PHS Publication No. 614; 1958; by William H. Stewart, Maryland Y. Pennell, and Lucille M. Smith; 106 pages; 55 cents.

Twelve descriptive statements. *PHS Publication No. 615; 99 pages; 55 cents.*

Homemaker services provided by about 150 agencies in continental United States are reported in the first of these publications. The nationwide study analyzes personnel policies and practices, administration, and policies governing service.

For the approximately 1,700 homemakers employed in these agencies, data on geographic distribution, training and experience, and work schedules are presented. Characteristics of families served as well as sources of referral and services performed by homemakers are also described.

Summary statistics for the study week and for the previous year show

the volume of service and sources of funds for public and for voluntary agencies.

The programs described in the second publication illustrate major variations in organization, administration, and practices among the agencies providing homemaker services. Information on historical background, administration, policies and practices, advisory committees, financing, and evaluation is included in these statements, prepared by the individual agencies.

These publications should be helpful to persons interested in establishing new programs or improving existing ones.

Selected Materials on Environmental Aspects of Staphylococcal Disease. *PHS Publication No. 616; 1959; 289 pages; \$1.50.*

Papers dealing with specific problems of hospital environment and lists of additional readings, audio-visual training aids, and sources of assistance are compiled for use as a reference and guide in developing training programs.

Major topics covered are building construction, water supply and liquid waste disposal, air contamination control and dust suppression, housekeeping and maintenance, and disinfection and sterilization.

Health Statistics From the U.S. National Health Survey. *Acute conditions, incidence and associated disability, United States, July 1957-June 1958. PHS Publication No. 584-B6; 1958; 17 pages; 35 cents.*

Incidence rates are estimated for infectious and parasitic diseases; respiratory and digestive disorders; fractures, dislocations, sprains, and strains; contusions, superficial injuries, open wounds, and lacerations; other current injuries; and all other acute conditions.

Data are given by age, sex, various severity criteria, and calendar quarter. Disability is shown in bed-days, work-loss days, and school-loss days.

Thirty-seven detailed tables and nine graphs are included. Two appendixes present technical notes on methods and definitions of terms.

Protecting Crops and Consumers. *The Food and Drug Administration's pesticide control program. FDA Leaflet No. 6; 1958; 11 pages.* Directed to farmers, agricultural leaders, and shippers of fresh fruits and vegetables. Designed to promote compliance with Federal law restricting amounts of pesticide residues which may remain on food crops. Defines "tolerance," presents rules for grower and packer-shipper, and outlines consequences of non-compliance with the law.

The Scientist in the Food and Drug Administration. *FDA Publication (unnumbered); 1958; by Robert S. Roe; 24 pages.*

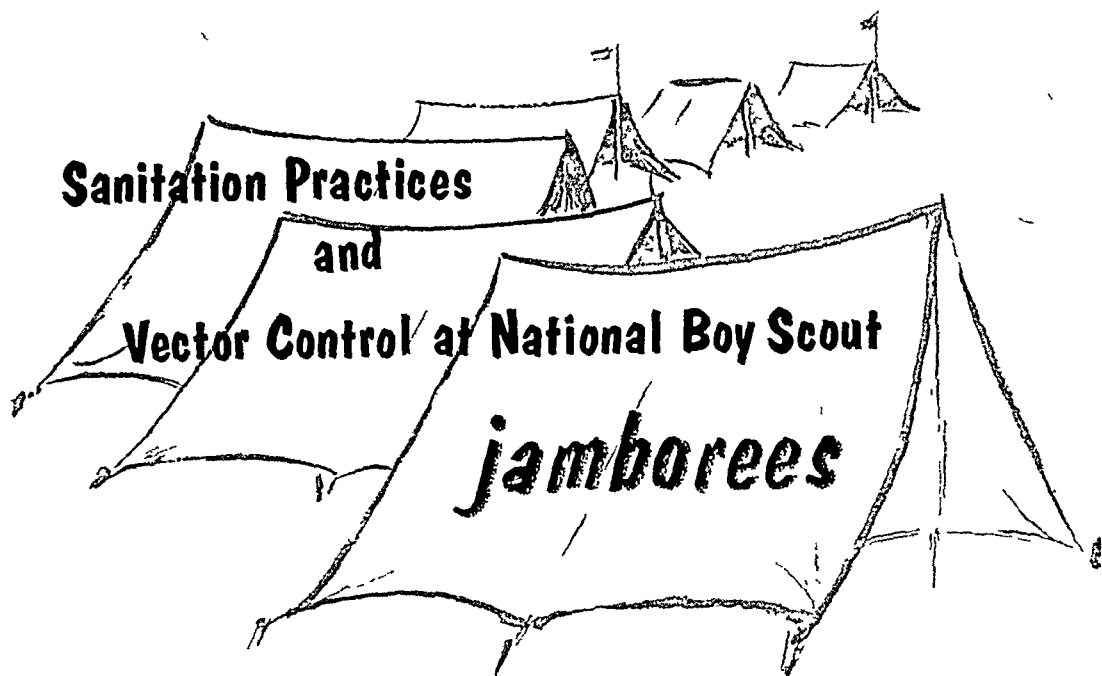
Directed to college seniors and graduates, this illustrated recruiting brochure describes opportunities to use scientific training in positions offered in Washington, D.C., and 17 other major cities.

Work in the fields of food and nutrition, pharmaceutical chemistry, pharmacology, antibiotics, and cosmetics is discussed. Included also are outlines of the functions of the administrative scientists and the field service.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.



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EFFECTIVE vector control and sanitation practices permitted large, transient populations attending the 13-day National Boy Scout Jamborees to live, eat, and sleep outdoors free of annoyance from flies and mosquitoes.

Experience gained at the 1953 jamboree in Orange County, Calif., attended by 43,000, and at the 1957 event, in Valley Forge State Park, Pa., attended by 51,000, can be applied to other mass gatherings, such as recreational, educational, and religious encampments, and used in civil defense planning and in natural disasters.

Mr. Fehn is a sanitary engineer and Mr. Maddock is a medical entomologist with the Technical Development Laboratories, Communicable Disease Center, Public Health Service, at Savannah, Ga.

In cooperation with environmental sanitation personnel of State and local health departments, Mr. Fehn was responsible for vector control and related operations at the 1953 and 1957 National Boy Scout Jamborees. Both authors were assigned by the Public Health Service to the Boy Scouts of America for this task.

Both Boy Scout jamboree camps were located in suburban areas near large cities. The Scouts attending were grouped in sections, 36 at the California encampment and 38 at the Pennsylvania one. Each section included approximately 34 troops, and each troop, 4 patrols. A patrol consisted of nine boys and an adult leader.

Each patrol cooked its meals on charcoal grills and used paper plates and other paper items for food service. Every section had a tent commissary for the storage and distribution of food and used three walk-in electric refrigerators, each with a capacity of 150 cubic feet. Camp leaders, firemen, policemen, and maintenance men ate at large tent-covered messes. Each camp had five trading posts equipped with hamburger grills and milk and soft drink dispensing units.

At both jamborees some houseflies from the surrounding areas were attracted to the trading posts and large messes. Only the trading posts in California were screened. Eating sites of patrols were free from flies except in a few

Highlights of the National Conference on Air Pollution, 1958. *PHS Publication No. 648; 1958; 42 pages; 35 cents.*

A summary of the National Air Pollution Conference held in Washington, D.C., in November 1958, this booklet contains a digest of the six discussion sessions and a full report of the recommendations resulting from those sessions.

The topics covered were extent and sources of air pollution; its health, economic, and social effects; and methods, procedures, and administrative aspects of air pollution control.

Included also are excerpts of statements by Secretary of Health, Education, and Welfare Arthur S. Flemming, Surgeon General Leroy E. Burney, and Senator Thomas H. Kuchel, who introduced the first Federal air pollution control legislation in 1955.

Homemaker Services in the United States, 1958.

A nationwide study. *PHS Publication No. 644; 1958; by William H. Stewart, Maryland Y. Pennell, and Lucille M. Smith; 106 pages; 55 cents.*

Twelve descriptive statements. *PHS Publication No. 645; 99 pages; 55 cents.*

Homemaker services provided by about 150 agencies in continental United States are reported in the first of these publications. The nationwide study analyzes personnel policies and practices, administration, and policies governing service.

For the approximately 1,700 homemakers employed in these agencies, data on geographic distribution, training and experience, and work schedules are presented. Characteristics of families served as well as sources of referral and services performed by homemakers are also described.

Summary statistics for the study week and for the previous year show

the volume of service and sources of funds for public and for voluntary agencies.

The programs described in the second publication illustrate major variations in organization, administration, and practices among the agencies providing homemaker services. Information on historical background, administration, policies and practices, advisory committees, financing, and evaluation is included in these statements, prepared by the individual agencies.

These publications should be helpful to persons interested in establishing new programs or improving existing ones.

Selected Materials on Environmental Aspects of Staphylococcal Disease. *PHS Publication No. 646; 1959; 289 pages; \$1.50.*

Papers dealing with specific problems of hospital environment and lists of additional readings, audiovisual training aids, and sources of assistance are compiled for use as a reference and guide in developing training programs.

Major topics covered are building construction, water supply and liquid waste disposal, air contamination control and dust suppression, housekeeping and maintenance, and disinfection and sterilization.

Health Statistics From the U.S. National Health Survey. Acute conditions, incidence and associated disability, United States, July 1957-June 1958. *PHS Publication No. 584-B6; 1958; 47 pages; 35 cents.*

Incidence rates are estimated for infectious and parasitic diseases; respiratory and digestive disorders; fractures, dislocations, sprains, and strains; contusions, superficial injuries, open wounds, and lacerations; other current injuries; and all other acute conditions.

Data are given by age, sex, various severity criteria, and calendar quarter. Disability is shown in bed-days, work-loss days, and school-loss days.

Thirty-seven detailed tables and nine graphs are included. Two appendices present technical notes on methods and definitions of terms.

Protecting Crops and Consumers. The Food and Drug Administration's pesticide control program. *FDA Leaflet No. 6; 1958; 11 pages.* Directed to farmers, agricultural leaders, and shippers of fresh fruits and vegetables. Designed to promote compliance with Federal law restricting amounts of pesticide residues which may remain on food crops. Defines "tolerance," presents rules for grower and packer-shipper, and outlines consequences of non-compliance with the law.

The Scientist in the Food and Drug Administration. *FDA Publication (unnumbered); 1958; by Robert S. Roe; 24 pages.*

Directed to college seniors and graduates, this illustrated recruiting brochure describes opportunities to use scientific training in positions offered in Washington, D.C., and 17 other major cities.

Work in the fields of food and nutrition, pharmaceutical chemistry, pharmacology, antibiotics, and cosmetics is discussed. Included also are outlines of the functions of the administrative scientists and the field service.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

Each troop had a privy consisting of two toilets and one urinal in an unpainted wooden riser box enclosed by a tent.

In California it became necessary to spray the privies with 2 percent chlordane emulsion for the control of black widow spiders. By the end of the encampment several of the older privies had begun to produce houseflies. Large pit privies, used for male visitors, were difficult to maintain and were major fly attractants. Several were producing houseflies by the last day of the encampment.

Chemical toilets, furnished and serviced by a commercial firm, were provided for female visitors in California and for all visitors and headquarters staff members in Pennsylvania. At the 1957 jamboree, 110 chemical toilets were augmented by 22 tent-enclosed men's trough urinals discharging into small seepage pits. Both the chemical toilets and the tented urinals were highly satisfactory. It was not necessary to spray the bored hole privies, and vectors did not prove to be troublesome.

The majority of the Scouts slept on the ground in two-man tents. In California boys

were bitten by ants and were in fear of being bitten by black widow spiders. In Pennsylvania 186 cases of extremely painful ear invasions by adult beetles (*Scarabaeidae*) occurred in sleeping Scouts (1). The principal beetle involved was *Autoserica castanea* Arrow. There were a few invasions by *Cyclocephala borealis* Arrow. Cotton ear plugs were used as a control measure. No cases were reported in persons sleeping on cots.

Insecticide-Impregnated Cords

Adult houseflies were attracted to both camps from surrounding breeding sources. At the 1953 jamboree 2 percent chlordane emulsion applied to resting places at the trading posts and large messes controlled the flies. In 1957 flies were controlled more easily and effectively with 2,100 feet of commercially produced cotton cord $\frac{3}{32}$ inch in diameter, impregnated with parathion and Diazinon, which cost \$28. Cords were easily installed in the trading posts and large messes with a hand-operated staple tacker. The cords, about 20 linear feet per 100 square



A stake-truck is unloaded at the site of the sanitary landfill in Pennsylvania. A front-end loader pulls at the front end of the tarpaulin, rolling out refuse.



After meals Scouts put garbage in heavy paper bags inside plastic-coated cans. Later bags were placed on tarpaulins atop trucks.

instances when sanitation lapsed temporarily. Some rodents and ants appeared in the commissaries and large messes.

Water was obtained from large metropolitan supplies. The maximum consumption at the California jamboree was about 750,000 gallons or 17 gallons per person per day. Meters were not used in 1957; however, the system was designed for a maximum flow of 30 gallons per person per day. In California, leaks caused by troublesome above-ground water main couplings created mosquito-breeding areas. This hazard was reduced in Pennsylvania by placing the mains in trenches at least 6 inches deep.

Each section had a cold water shower with the waste water piped to a remote low point, and a four-spigot water drawing station built over a small seepage pit. Water was carried in 5-gallon gasoline cans to two Lister bags, one for drinking water and one for washing, at each troop site.

For the disposal of waste wash water each troop site had a small sump covered with an expanded metal grate; large messes and trading posts used covered seepage pits. No difficulties with vectors developed around the water drawing stations, the Lister bags, or the disposal facilities for waste water.

Refuse Disposal

The refuse from the entire camp amounted to 650 cubic yards per day in California and 1,000 cubic yards per day in Pennsylvania. In California each troop was provided with three garbage cans which were placed at a central point for collection each night. Operational difficulties experienced with this system included scattering of refuse at the central storage points because of reduced nighttime supervision, excessive noise during sleeping hours, and failure to collect all refuse because of greater nighttime absenteeism of collection employees.

In Pennsylvania a more efficient system was used. Each troop was issued an inexpensive, 22-gallon, plastic-coated metal garbage can, and received a daily supply of four 50-pound wet-strength paper bags. Garbage was placed in the bags after each meal, and the bags were tied and taken to a 1½-ton stake-body truck, stationed at each section.

Each truck was equipped with a canvas tarpaulin with one end fastened to the tailgate and the other end tied by ropes to the top of the forward stakes. Refuse bags were placed on the top of the tarpaulin, and the trucks hauled them to the disposal site three times a day. The vehicles were unloaded by pulling on the upper end of the tarpaulin with a front-end loader, thus rolling out the refuse. Each truck bed was sprayed once a day with a mixture of 2 percent chlordane emulsion and a deodorant. There were few sanitation lapses in this system and no vector problems.

In California refuse was disposed of partly by burning, which attracted flies, and partly by sanitary landfill. At the 1957 jamboree all refuse was handled easily, without burning, in one sanitary landfill, and there were no difficulties with vectors.

Prior to the jamborees three holes, each 1 foot in diameter and 6 feet deep, were power-bored for each privy at the encampment site.



Cotton cord impregnated with parathion and Diazinon controls houseflies at the unscreened trading post. Cord is strung horizontally above the refrigerator to the serving counter.

Equipment and Staff

A 4-wheel drive jeep equipped with power take-off mechanism, a 55-gallon stainless steel tank, a 50 p.s.i. insecticide pump, 150 feet of $\frac{3}{4}$ -inch rubber hose, and a spray gun, adjustable from solid spray to a fine mist, were suitable for most insect control operations. Hand spray cans were used to reach places inaccessible to the jeep. In addition, spray cans were lent to section leaders desiring to spray their areas.

All control work was done or closely supervised by professional staff members of the Public Health Service or the respective State health departments. Particular care was exercised when pesticides were applied or exposed near food. Each jamboree required four full-time staff members for vector control work.

Summary

The jamborees demonstrate that it is possible to eat, sleep, and live in the open free of annoyance from flies and mosquitoes. Excellent basic sanitation practices supplemented by the judicious application of pesticides were responsible for the control of these vectors.

Commercially prepared, insecticide-impregnated cords proved to be a cheap, easily installed, and effective housefly control measure in Pennsylvania. A power sprayer equipped with a long hose and mounted on a 4-wheel drive jeep was ideal for most insect control operations. Chlordane emulsion proved to be a satisfactory, broad spectrum insecticide.

Warfarin served as a safe, effective rodenticide against many different species of rodents.

Elevated beds, such as cots, would be most useful in reducing contact with beetles, crawling insects, and small rodents. Certain beetles warrant consideration as public health nuisances in planning future encampments.

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feet of floor area, were draped horizontally between tent posts or counter struts, or both, at heights of 8 to 10 feet. Vertical drop sections were not used. This amount of cord is somewhat less than the 30 linear feet per 100 square feet recommended by the Public Health Service (2-5).

Houseflies were repelled for about 5 minutes after the cord was hung, but subsequently they rested readily on the treated cord during the day and night. Control was obtained within a few hours. Excessive temperatures of hamburger grills in two trading posts caused grease to be deposited on the cords, making it necessary to replace them after 7 days.

Mosquitoes and Other Insects

Mosquitoes were controlled successfully at their breeding sites at both jamborees with DDT or chlordane emulsion larvicide applied by power sprayers. The California camp was located within the geographic jurisdiction of the Orange County Mosquito Abatement District and thus control work by Boy Scout authorities was not necessary.

The Pennsylvania area had no local mosquito control program. Accordingly, larviciding measures were started 5 weeks before the encampment, with 2 percent DDT or 1 percent chlordane emulsion. Sanitarians from the Pennsylvania Department of Health and the authors used a Public Health Service jeep-mounted power spray unit for this work.

Ants, black widow spiders, ticks, wasps, sand fleas, rodent ectoparasites, and a variety of other insects were controlled satisfactorily with 2 percent chlordane emulsion applied as a residual to the point of runoff. Chlordane is a broad spectrum insecticide of great usefulness in temporary encampments.

In 1946, plague was found in squirrel fleas taken from the encampment area in Orange County, Calif. The Orange County Department of Agriculture, in close cooperation with California health authorities, conducted extensive wild rodent eradication campaigns in 1952 and 1953. Just before the jamboree 5 percent dieldrin dust was applied by aircraft over the entire camp at the rate of 25 pounds of dust per acre to control rodent ectoparasites. These measures were highly effective.

Rodent Control

Warfarin was effective in safely controlling a wide variety of rodents including domestic rats, house mice, field mice, and gophers. Small, shallow paper plates containing 0.025 percent warfarin in cornmeal or rolled oats were placed in protected locations. Specially constructed bait stations were not used.

A few rodent bites, mostly on the hands, occurred when boys attempted to make pets of wild rodents found in the area or brought from home for trading.

When the nocturnal noise of rodents annoyed tent occupants, 2 percent chlordane emulsion was applied to the burrows, and openings were closed with earth. This treatment was effective in eliminating the annoyance. The chlordane probably acted as a repellent to drive the rodents to a new home in nearby woods or ravines and killed any rodent ectoparasites left behind.



Insecticide-impregnated cord is installed in a food serving area. A staple tacker is used to attach the cord to counter struts and posts.

WHO *looks ahead*

The next 10 years of WHO was the theme of the sixth annual meeting of the National Citizens Committee for the World Health Organization, in St. Louis, Mo., on October 29, 1958.

Dr. Leonard W. Larson, chairman of the board of trustees of the American Medical Association, said that the principal challenges of the next 10 years will be to clarify the relationship between medicine and world peace, to control and eliminate communicable diseases, to construct hospitals and medical educational institutions in underdeveloped countries, and to train leaders on their native soil.

Dr. Leroy E. Burney, Surgeon General of the Public Health Service, cited evidence of the new and vigorous support of international health by this Nation. He observed that public health workers must have a high sense of mission in international health, a field that requires many more well-qualified workers, especially those with flexibility enough to feel at home anywhere. This means, he said, that many of us must learn to accept the entire world as our field of responsibility.

Excerpts from the St. Louis conference have been published by the National Citizens Committee in New York City. Four of the papers presented at the conference are summarized below.

Mortality From Infections Blamed on Malnutrition

Malnutrition plays a much greater role in the high mortality of young children in some areas of the world than has been hitherto appreciated, averred Dr. Nevin S. Scrimshaw, regional adviser in nutrition, Pan American Sanitary Bureau, Regional Office for the Americas of the World Health Organization.

Scrimshaw observed that the synergistic relationship between malnutrition and infection must be understood as a basis for future control programs. The high death rate for children under 5 years of age in underdeveloped countries is often attributed to infections, but, he said, field studies suggest that perhaps a third of these children are dying with the signs and

symptoms of malnutrition, usually precipitated by an acute infectious episode. A considerable proportion of the other two-thirds, Scrimshaw added, are dying of infections which would not ordinarily be fatal to a well-nourished child.

Kwashiorkor

Efforts to reduce the incidence of kwashiorkor, a serious nutritional disease of children, were cited by Scrimshaw as evidence that the recommendations of expert WHO committees stimulate research and promote effective control.

Prior to the first meeting of the Joint Expert Committee on Nutrition of the Food and Agricultural Organization and the World Health Organization, Scrimshaw said, no one was aware that kwashiorkor had a common nature or that the syndrome resulted from protein

- (4) Smith, A. C.: Fly-cord studies in California. Calif. Vector Views 5: 57-61, September 1958.
 (5) Schoof, H. F., and Kilpatrick, J. W.: House fly

control with parathion and Diazinon impregnated cords in dairy barns and dining halls. J. Econ. Ent. 50: 24-27, February 1957.

Epidemiological Notes

Septicemia

Since 1948 there has been a perceptible increase in the number of deaths from septicemia. While the total is not large when compared with numbers of deaths from certain chronic diseases or tuberculosis, it is now larger than the number for most notifiable diseases. The mortality rate for septicemia doubled (0.4 to 0.8 per 100,000 population) during the period from 1949 to 1957.

As shown in the table, the number of deaths from staphylococcal septicemia rose steadily in the same period. On the other hand, the frequency of deaths from streptococcal septicemia declined while the number for pneumococcal septicemia remained stationary. The category for other specified types, which includes among other infections those caused by pseudomonas and coliform organisms, also increased substantially. A large proportion, more than two-thirds of the total septicemia deaths, were not identified as to type. These are designated as unspecified. The number of deaths in this category increased, especially in 1956 and 1957.

Sepsis of the newborn, that is, in infants under 1 month of age, is not included in the above categories. The numbers of deaths from this cause are shown in the last column. The trend in this group is also upward.—DR. CARL C. DAUER, *medical adviser, National Office of Vital Statistics, Public Health Service.*

Number of deaths from septicemia and pyemia in the United States, 1 month of age and over (053)							Sepsis under 1 month (767-768)
Year	Total	Staphylococcal	Streptococcal	Pneumococcal	Other specified	Unspecified	
1957.....	1,351	217	67	23	76	968	832
1956.....	1,118	160	64	23	54	817	662
1955.....	938	111	67	22	43	695	518
1954.....	897	109	62	19	44	663	485
1953.....	783	94	68	29	38	554	388
1952.....	726	79	72	24	31	520	356
1951.....	677	64	71	18	24	500	387
1950.....	616	62	76	20	29	429	320
1949.....	587	54	92	16	27	398	307

NOTE: Numbers in parentheses refer to International Classification of Diseases.

Information that is being sought for diseases such as atherosclerosis and cancer is at hand for today's major infectious diseases. What is needed, McDermott pointed out, is information that is much more precise and in many ways more subtle. It is a mistake, he said, to consider tuberculosis or kwashiorkor, for example, as individual diseases. They are "hyphenated diseases," for when a child dies of tuberculosis, what he really dies of is tuberculosis-malnutrition.

Scanty Background

McDermott described the scientific background of hyphenated diseases as appallingly scanty, but pointed out that some studies are underway to offset this deficiency. He cited research by Dr. René Dubos and by Dr. Loyd Hedgecock which has shown that mice immunized with BCG could have their immunity either totally suppressed or fully expressed by alterations in their diet.

Studying the transmission of tuberculosis would be another valid research endeavor, McDermott said. He observed that little research is being done at present on this because in the economically developed countries tuberculosis can be controlled without exact knowledge as to how transmission takes place. Yet today, in many places, he said, a single-room, one-floor hut houses 12 adults and children, several of whom are breathing tuberculosis bacilli which have lost their pathogenicity for guinea pigs and monkeys but have retained it for mice. It would be to our advantage, McDermott said, to set up chambers recreating these conditions and studying and defining them so that we might know what happens.

Two Points

McDermott called attention to the fact that the development of vaccines and drugs has made it possible to place in the hands of an illiterate villager the power to deliver a more effective treatment to a person critically ill of pneumonia, meningitis, or tuberculosis than could have been done by the most highly skilled physician of 25 years ago. We have been slow in facing up to what this situation implies, he said, and also

in exploiting it for man's benefit. He suggested that a greatly expanded research effort is needed on the medical, sociological, and economic aspects of this situation.

McDermott also questioned the common assumption that when a particular infection in an underdeveloped country is under control, the people will inevitably face the same diseases that we now have. Is this necessarily the case? he asked. Is it not possible that wholly different patterns of disease balance might emerge in a somewhat sanitized environment which is still predominantly rural, rustic, and otherwise unchanged? This, too, he said, is an important matter for WHO research, especially by social scientists.

In closing, McDermott emphasized the need for research on what will continue to be important problems of the WHO program. Basic research in health, for WHO's purposes, should broaden our understanding, while, at the same time, it should prove to have broad application, he concluded.

Hazards of Living Worse Than Dangers of Dying

We must shift our emphasis from the dangers of dying to the hazards of living, for in today's world the solution of one health problem invariably creates others, declared Dr. John W. Knutson, chief dental officer, Public Health Service.

In less fortunate parts of the world, he said, teeming millions are being kept alive, but they are malnourished or starving, ill-housed or unhoused, and illiterate.

Knutson observed that international health efforts are not free of political implications. Standards of living and levels of consumption, he said, exert an important impact on political thinking and attitudes. Malnourished bodies and sick minds are not a sound base for rational citizenship in a peaceful world.

Knutson also pointed out dental health needs abroad. Many people, he said, cannot afford refined dental services such as gold inlays or even fillings, but they still need relief from pain and infection.

malnutrition. Clinicians, largely unaware of the work of others, were publishing reports in many countries. Public health authorities did not recognize the disease.

As a result of the expert committee's recommendations, researchers were sent to Africa and to Central and South America. Their reports made it evident to nutritionists, pediatricians, and persons concerned with child health in more than 60 countries in which kwashiorkor occurs that the disease was a major cause of the high mortality in preschool children and that it was a public health problem for which solutions had to be found.

Scrimshaw pointed out that solutions have been expedited by WHO's policy of providing fellowships and travel grants, seeing to it that knowledge is pooled, and trying out preventive measures on a coordinated basis. As a result, he said, first class research has been completed, human resources have been developed to combat deficiency diseases, and campaigns against protein malnutrition have "snowballed." Active work on the development of additional protein-rich foods for the supplementary and mixed feeding of infants and young children has taken place in more than 25 centers in 18 of the countries in which protein malnutrition is acute.

Other Work in Nutrition

A particular feature of WHO's program in nutrition, Scrimshaw noted, is the attention given to developing the technical capacities of individual workers in areas of great need. The real underdevelopment of the so-called technically underdeveloped countries, he said, is the shortage of persons educated and experienced in using the resources in their areas.

WHO has also made a significant contribution in the field of nutrition by using consultants. Consultants, Scrimshaw observed, are particularly useful in disseminating current knowledge to local medical and health workers and in helping countries devise plans to meet their specific needs.

Recommendations

Scrimshaw recommended that in the future WHO seek:

- To increase the number and competence of trained personnel in underdeveloped countries.

- To finance doctorate programs in public health and postdoctorate training for periods beyond the conventional year.

- To see that consultants who are brought into a region to give special assistance turn their functions over to local people as soon as possible.

- To help develop the human resources of the countries in which international agencies are working.

- To give more assistance to member countries of WHO in preventing toxicity of intentional food additives, and to help reduce acute nutritional problems which arise when there is a changeover from foods prepared by indigenous means to foods prepared in accordance with modern food technology. (Infantile beriberi occurred in the villages of some south-east Asian countries when power-driven rice mills were introduced.)

- To enlarge the permanent nutrition staffs of WHO and PASB to enable them to respond to increasing demands from health authorities for guidance.

Prognosis

Scrimshaw stated that information from studies of the effects of nutrition on differences in the prevalence of chronic disease will result in regimens conducive to greater longevity and better health in older persons.

He also envisioned nutrition as becoming an increasingly routine health activity, with current, specific nutritional problems gradually being overcome.

Emphasizes Applicability Of Basic Research

The research program of the World Health Organization should concern itself with providing as broad a scientific base as possible from which to mount successful attacks on today's major diseases, according to Dr. Walsh McDermott, professor of public health and preventive medicine at the Cornell University Medical College.

The major diseases, he said, are neither obscure nor exotic; they are commonplace diseases.

At present, malaria eradication is complete or far advanced in 16 countries. Eradication has begun in 45 and is planned in 14. To protect their own investments, the national health administrations in the later stages of eradication want to prevent the importation of malaria, and, where malaria is present or a potential threat, to avoid the introduction of a foreign species of vectors or insecticide-resistant vectors.

The United States has taken the lead in supporting malaria eradication and cannot afford to see it fail or be unnecessarily handicapped,

Soper asserted. But eradication from the world requires supplies, equipment, technical orientation, and labor which many malarious areas cannot supply and cannot be expected to supply for themselves.

Within the next 10 years malaria can be eradicated from most of the infected areas if areas that were previously infected and those which become free of the disease support adequately, both technically and financially, the present eradication campaigns coordinated by the World Health Organization.

Water Pollution Control



Statute authorizing Water Pollution Control Board to classify waters in accordance "with considerations of best usage in the interest of the public" held to establish sufficiently definite standards for administrative action. *Application of City of Utica*, 177 N.Y.S. 2d 47 (Supreme Court of New York, Appellate Division, 1958).

The City of Utica sought to prohibit the State Water Pollution Control Board from proceeding with a hearing in respect to alleged pollution of the Mohawk River by discharges from municipal sewers of the city in violation of standards of water purity promulgated by the board pursuant to State law, on the ground that the law constituted an invalid delegation of legislative power in violation of the State constitution.

The statute directed the board to classify the waters of the State "in accordance with considerations of best usage in the interest of the public" taking into consideration factors such as current usage, extent of present pollution, and the limitations on specific pollutants set out in the statute.

In upholding the board and the statute, the court noted that under the State law the classification of waters and the water quality standards were to be adopted only after public hearing on notice to the municipalities and others concerned, and the actions of the board were made subject to judicial review.

It quoted with approval the rule that where the legislature "legislated on the subject as far as was reasonably practicable, and from the necessities of the case was compelled to leave to executive officials the duty of bringing about the result pointed out by the statute, the functions of the administrator, even where great latitude is granted, will be held administrative and lawful."

Returning to the statute, the court held that in the light of the express recognition in the law by the legislature that "due to variable factors, no single standard of quality and purity of the waters is applicable to all waters of the State or to different segments of the same waters," and considering the breadth and highly technical nature of the problem, the legislature could scarcely have devised more definite and specific standards. Accordingly, it held that the statute provided definite and sufficient standards to guide and, at the same time, to control and limit the board in the exercise of the discretion necessarily committed to it.

In Burma, he said, only 19 qualified dentists are available to serve the needs of 19 million people. It is here, he brought out, that queues of people can be seen in search of relief from dental pain and distress. It is here and in similar countries that the distressing complications of well-intended but grossly septic ministrations by untrained and unequipped local practitioners can be observed. But most important, it is here that there is little or no semblance of proposals or plans for action which will foster the evolution of a cadre of dental service personnel so that the future situation will be better than the present.

Multinational Effort Needed To Achieve Eradication

The successful eradication of a disease or vector requires funds and support from each country where a possible seedbed of infection exists, asserted Dr. Fred L. Soper, director emeritus, Pan American Sanitary Bureau, Regional Office for the Americas of the World Health Organization.

Although eradication is not a new concept, it is a new weapon because the governments of the world are beginning to collaborate in solving common health problems through such agencies as the World Health Organization, he stated.

The first such international effort was the commitment made by the nations of the Americas in 1947 to eradicate the urban vector of yellow fever, the *Aedes aegypti*. Soper traced this joint action to efforts to prevent reinfestation of Brazilian cities that had been freed of the vector.

Brazil's National Yellow Fever Service had shown that it was cheaper to eradicate the mosquito from its peripheral haunts than it was to maintain permanent vigilance against its reintroduction into major cities. The service was committed in 1940 to eradicate the vector from all parts of the country. Within 6 years eradication was so successful that Brazil's major concern was reinfestation not only from countries sharing its borders but also from more distant nations that might reinfest its neighbors.

"We now have it within our power to eradicate from the face of the earth that age-old scourge of mankind: malaria. We are embarking with other nations in an all-out, 5-year campaign to blot out this curse forever. We invite the Soviets to join with us in this great work of humanity."—DWIGHT D. EISENHOWER, January 9, 1958.

By committing themselves to eradication in 1947, the countries of the Americas were not only protecting their own people, but they were recognizing the right of Brazil to be protected from reinfestation, Soper said. This experience with *A. aegypti* illustrates that once eradication begins locally, the threat of reinfestation or reinfection from the periphery generates pressure to expand eradication.

Similarly, the U.S.S.R. proposal at the Eleventh World Health Assembly to eradicate smallpox worldwide within 5 years is based on the fact that once smallpox had disappeared from Soviet territory, the machinery and expense of maintaining protection for its population would be unnecessary if the disease were eradicated from the rest of the world.

By voting funds for the national malaria eradication campaign in 1947, the United States Congress committed the Government to a continuing interest in the occurrence of malaria in Mexico, Korea, and all parts of the world from which the United States may be reinfected, Soper declared.

Eradication has emphasized the interdependence of countries in protecting areas freed of malaria. Venezuela found it had a stake in the eradication of malaria in Colombia, Brazil, the Guianas, Trinidad, and even Africa.

In 1954 the delegate of France to the 14th Pan American Sanitary Conference asked how a country once freed of malaria could protect itself against reintroduction of the disease. In the final analysis, Soper said, the only answer is "by joining with all the countries of the world in financing the elimination of the remaining seedbeds of infection wherever they may be."

Malaria, a local endemic disease a decade ago, has become as important to quarantine authorities as smallpox, yellow fever, cholera, plague, and typhus.

At present, malaria eradication is complete or far advanced in 16 countries. Eradication has begun in 45 and is planned in 14. To protect their own investments, the national health administrations in the later stages of eradication want to prevent the importation of malaria, and, where malaria is present or a potential threat, to avoid the introduction of a foreign species of vectors or insecticide-resistant vectors.

The United States has taken the lead in supporting malaria eradication and cannot afford to see it fail or be unnecessarily handicapped,

Soper asserted. But eradication from the world requires supplies, equipment, technical orientation, and labor which many malarious areas cannot supply and cannot be expected to supply for themselves.

Within the next 10 years malaria can be eradicated from most of the infected areas if areas that were previously infected and those which become free of the disease support adequately, both technically and financially, the present eradication campaigns coordinated by the World Health Organization.

Water Pollution Control



Statute authorizing Water Pollution Control Board to classify waters in accordance "with considerations of best usage in the interest of the public" held to establish sufficiently definite standards for administrative action. *Application of City of Utica*, 177 N.Y.S. 2d 47 (Supreme Court of New York, Appellate Division, 1958).

The City of Utica sought to prohibit the State Water Pollution Control Board from proceeding with a hearing in respect to alleged pollution of the Mohawk River by discharges from municipal sewers of the city in violation of standards of water purity promulgated by the board pursuant to State law, on the ground that the law constituted an invalid delegation of legislative power in violation of the State constitution.

The statute directed the board to classify the waters of the State "in accordance with considerations of best usage in the interest of the public" taking into consideration factors such as current usage, extent of present pollution, and the limitations on specific pollutants set out in the statute.

In upholding the board and the statute, the court noted that under the State law the classification of waters and the water quality standards were to be adopted only after public hearing on notice to the municipalities and others concerned, and the actions of the board were made subject to judicial review.

It quoted with approval the rule that where the legislature "legislated on the subject as far as was reasonably practicable, and from the necessities of the case was compelled to leave to executive officials the duty of bringing about the result pointed out by the statute, the functions of the administrator, even where great latitude is granted, will be held administrative and lawful."

Returning to the statute, the court held that in the light of the express recognition in the law by the legislature that "due to variable factors, no single standard of quality and purity of the waters is applicable to all waters of the State or to different segments of the same waters," and considering the breadth and highly technical nature of the problem, the legislature could scarcely have devised more definite and specific standards. Accordingly, it held that the statute provided definite and sufficient standards to guide and, at the same time, to control and limit the board in the exercise of the discretion necessarily committed to it.

Obtaining the Physician's Cooperation in Reporting Communicable Disease

DOROTHY T. MAGALLON, M.D.

WHEN a public health physician goes into a community, there are many intangible but very real factors that can spell the difference between his success or failure as a health officer. Gaining the confidence and cooperation of the practicing physicians in the area is certainly an important factor. However, even in a community where relationships are of the best, the reporting of communicable disease is often a distinct problem. The same physician who may extend himself to cooperate with the health department at every possible turn often is not aware of the practical importance of reporting disease. Even though State laws require the reporting of certain diseases, we have come a long way from the day when failure to report such a disease was a crime often punishable by death—death not only to the patient but to his family, friends, and sometimes an entire community.

It is the task of public health people to convince private physicians that the time they spend reporting their cases of communicable diseases is still a worthwhile investment. When these physicians are made to feel that the value received in services to them and their patients is worth the effort expended, few will fail to report.

The first step in that direction may be to

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remind the doctors of the community that the health officer considers service to the private physician and his patients one of his main duties. It is surprising how often the practicing physician thinks of the health officer as someone who looks after the health of indigents and has very little to do with him and his private patients who after all comprise a large segment of the community.

Ideally, a health officer new to an area should visit the doctors in practice there, but this may not be practical in large communities. If a personal visit is not possible then a letter introducing the new health officer and listing some of the services available to the physician through the health department may be effective. The letter should be accompanied by a list of the reportable diseases and might stress the advantages to the private physician and his patient of reporting these diseases rather than the advantages to the health department or even the community as a whole.

Reporting by Telephone

The method of reporting disease must be kept simple. As concise as the morbidity card is, many physicians complain that neither they nor their office staff have the time to fill it in. One solution is to encourage the doctor or someone in his office to make telephone reports.

Telephone reporting actually has a number of advantages. It may give the health officer or his secretary an opportunity to learn about other similar cases by asking a few brief questions. For example, suppose Dr. Brown is reporting to me a case of infectious hepatitis

in a child. I would first ask the doctor how he felt about giving gamma globulin to family contacts. Dr. Brown might say he had not seen much infectious hepatitis and he was not too familiar with the use of gamma globulin in contacts but how did the health department feel about it. At this point I can offer a service to Dr. Brown and his patient by sharing with him the knowledge of gamma globulin's value in hepatitis contacts and by telling him that the health department can supply him with gamma globulin for this purpose. Now if there is one thing that sticks in Dr. Brown's mind about gamma globulin, it is probably the fact that it is very expensive when bought through a pharmaceutical house. If he is sold on its value, you can be sure he will report his next case of infectious hepatitis and request gamma globulin for the contacts.

By this time the doctor may not mind answering a few more questions. When asked if he has heard of any more hepatitis in his neighborhood he may remember that Dr. Smith mentioned a case to him just a few days ago. One more question, "Where does the child go to school?" will round out the picture as far as the health officer is concerned.

This entire conversation takes less than 5 minutes, yet it accomplishes the following important things:

1. The private physician has been made aware of a health department service to him and his patient because he reported a communicable disease. The reporting of that disease now means something more to him than merely satisfying a State law. If for no other reason he may now report a disease just to see what the health department has to offer.

2. The physician has been made to feel that he is an important link between his patients and the health officer whose duty it is to safeguard the health of the entire community.

3. The health officer has found at least one other case of the disease in question and has gained information that will aid him in whatever type of epidemiological investigation he may wish to institute.

From the point of view of everyone concerned this 5-minute telephone conversation has been a good investment of time.

Telephone reporting may be used very prof-

itably when an outbreak of a particular disease is anticipated. For example, in Louisville and Jefferson County, Ky., influenza of any type is not well reported by the physicians. In July 1957, Asian influenza was introduced into the community. To insure adequate reporting during the expected epidemic, a surveillance system was set up shortly after the first cases were proved by laboratory diagnosis. It first became apparent from a sudden marked increase in school absenteeism that influenza was on the upswing in the community. A conservative method of estimating probable cases of influenza from absenteeism in schools and industry was determined and was used throughout the outbreak. In order to supplement reporting through regular channels, each week the office of communicable disease control made telephone calls to the Louisville General Hospital outpatient department, health centers, the State laboratory, and 25 private physicians. These physicians were representative general practitioners and pediatricians from various sections of the city and county. In this way we were able to follow the course of the epidemic and arrive at fairly accurate, although probably conservative, statistics.

This system has been extended to other communicable diseases. When for some reason, perhaps from routine hospital or laboratory reporting, we have cause to believe that a disease is on the increase or may be prevalent in a certain section of the city, we contact the physicians in that area. We then do a check survey of the 25 representative physicians used originally in the influenza surveillance. In effect, they serve as a communicable disease barometer. Information gained in this manner to supplement reports through regular channels gives us a fairly accurate picture of infectious disease in the community.

Special Problems

Venereal disease and tuberculosis reporting present special problems in many areas. In Louisville and Jefferson County, the problems of tuberculosis reporting are magnified because the prevalence of the disease is so high. With a few exceptions the private physicians who treat tuberculosis report both new cases and

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Here again the letter used the idea of giving something, if only interesting statistics, before asking for something. It also gave a reason for reporting that had nothing to do with State law. Twelve self-addressed stamped envelopes for monthly reporting were enclosed with each letter, thereby making compliance with our request as simple as possible.

After 2 months only 3 veterinarians had failed to send their slips in. These were called by telephone and within 3 weeks each had submitted his certificates. For the first time, 100 percent of the Jefferson County veterinarians are reporting vaccinations. As a fringe benefit of this effort we are getting more reports from the veterinarians of clinically suspected rabies in animals and more animal heads for examination. We feel that our entire rabies control program has benefited.

Basic Ideas

There are many specific problems in reporting to be met in every community. We have found that the following basic ideas have been helpful to us when attacking any of these problems:

1. The public health physician who is fortunate enough to teach medical students or to talk at least occasionally to groups of physi-

cians has a prime opportunity to sell the value of reporting. It is true that few health officers have the opportunity to teach formally; but few lack the opportunity to educate informally if they will only accept the challenge.

2. Any group of doctors appreciates a frank but tactful approach.

3. Practicing physicians are very likely to think first of their patients; if we can show these physicians that they and their patients profit from good reporting, they will report.

4. Most private doctors have a sense of community responsibility but are quite naturally oriented to care for the individual patient. Because of this, they need to be reminded periodically of their importance in community health and the importance of good community health to them and their patients.

5. The idea of offering something (service, information, consultation, special laboratory and treatment procedures) before asking for something is always very appealing.

6. Any method used must be simple and require a minimum of time. Perhaps more important than all of these, the health officer himself must command the respect of his fellow physicians. He must not set himself apart; rather he must get to know the physicians in his community, for if he does his job well he will have occasion to communicate with them frequently, and it is much more difficult to communicate effectively with a stranger than with a friend. The local medical society is often a good focus around which to build such feeling. Many former problems, even difficult ones connected with the reporting of diseases, fade out in the glow of this kind of relationship.

However, no matter how good a relationship the health officer has with the physicians of his community, he will have to face one fact realistically. Rare is the community where physicians, unsolicited, will beat a path to the door of the health department for the sake of reporting communicable diseases. In the matter of reporting, the health officer must be the aggressor. It is his task to find the methods of stimulation which bring results in his community and to apply these methods as often as necessary to keep the reporting of communicable disease at a satisfactory level.

Principles of Reporting Communicable Disease

Although State laws require the reporting of communicable disease, good reporting depends on a mutual understanding of practicing physicians and health authorities.

What do health authorities need? First, prompt, reasonably accurate, and reasonably complete information on certain communicable diseases such as diphtheria and typhoid fever. By such means, remedial or preventive action can be triggered, and policy, legislation, and appropriations shaped.

Next, information on diseases such as psittacosis, brucellosis, and tularemia for which immediate action is less important. Trends in incidence and effects of new types of treatment can be observed and, possibly, controls developed at some future date.

Finally, there is need to know more about unusual occurrences of diseases that are reportable and those for which no individual case report is required. I refer to outbreaks of various kinds. There is a real need for more information on unusual occurrences such as venereal disease in an identifiable group, food poisoning and food infection epidemics, and outbreaks in schools and institutions. This information is needed in order to appraise trends and develop remedial measures.

The physician should be encouraged to feel that his reports set in motion procedures which will benefit both the patient and the community. Health officers build up confidence each time they inform physicians that a case or an outbreak is being investigated, an agent isolated, or control measures instituted. The physician should be made aware that his report on typhoid fever or diphtheria may be

only one of several received. The health agency is in the key position to provide this information and to demonstrate any tie among the reports.

In developing acceptance of this function, the health officer may remind physicians that public health laboratories are at their disposal and encourage their use. Or he may elect, with far-reaching consequences, to develop methods for disseminating information on morbidity.

For one town, newsletters, statistical reports, a few paragraphs in the newspaper may all be appropriate means of carrying the word. A weekly report for an entire State is almost a necessity; some States issue monthly summaries as well. In their weekly reports, some States also describe unusual happenings or present comparisons of disease incidence. Others include information on activities of the health department, on immunization procedures, and the like. In general, Federal agencies follow the same pattern.

Routine statistical reporting in which numbers only are used does not meet the demand for pertinent information. Explanations are needed as well. The circumstances or conditions that led to the occurrence of 10 cases of infectious hepatitis are more suggestive than the number "10." Physicians, and the public as well, wish to know whether reported cases are related in any way, how disease is transmitted, the original source of infection, and elements of immunity, resistance, and recovery. Good reporting, after all, includes the concept of what carries meaning and significance.—CARL C. DAUER, M.D., *medical adviser, National Office of Vital Statistics, Public Health Service.*

followups very poorly. Efforts to improve relationships between the health department and this particular group of physicians have not been too rewarding for many reasons. In an effort to correct this situation a letter which stated the problem frankly was sent out. The health department has many services to offer patients with tuberculosis but, by and large, the chest physicians were not making it possible for their patients to benefit from these services. Therefore, the letter asked the physicians to

suggest ways in which the health department can make these services available to their private patients.

Special problems in reporting arise in any community. In Louisville and Jefferson County, we have found that if these problems are met tactfully but frankly the results can be surprising. Here is how we met such a problem which had to do with rabies control. Rabies in our community is a serious problem, and much time and effort are spent in the con-

trol of this disease. Cooperation between the Louisville and Jefferson County Health Department and the veterinarians had not been of the best for reasons long since lost in antiquity. A number of the veterinarians failed each month to submit duplicate copies of animal vaccination certificates as required by law. A campaign to improve relationships with the veterinarians was started. Special emphasis was placed on animal epidemiology and the importance of the veterinarian's role in the control of rabies. Educational and publicity material coming from the health department stressed the importance of consulting a veterinarian when a pet had been bitten by another animal. Members of the county veterinarian's society were consulted frequently about the control of rabies in animals. The air cleared considerably. Then, a letter was sent out to all small-animal veterinarians in the county.

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For Tuberculosis Control Programs

TUBERCULOSIS control, despite notable progress in recent years, still demands a sizable share of public health attention in many communities, and the need for sound program statistics is as pressing as ever.

So much information is potentially available for studying the needs and achievements of tuberculosis control programs that great care must be taken to choose appropriate types and amount of data to be collected as service statistics. A health department will want to collect only data that are basic to its own program, in addition to those requested for State and national reports. The statistics selected should indicate the extent to which defined program objectives of tuberculosis control are being achieved. Progressive revisions of a program should of course be anticipated.

From tuberculosis service statistics it should be possible: (a) to indicate the size, composition, and location of the tuberculous population; (b) to determine whether or not the cases that require medical supervision are receiving supervision and the care they need; (c) to study the productiveness of casefinding techniques; and (d) to judge whether or not resources are being used effectively and efficiently.

The Indexes for Interpreting Data given in

this paper and the data items for developing these indexes, given under Statistical Information, are suggested as those which can be most helpful in planning, administering, and evaluating services in tuberculosis control. Neither the indexes nor the data items, however, can in themselves provide sufficient information for complete evaluation. The data must be related to one another and to other available information, and they must be grouped so that a clear picture results. Even then, appropriate decisions can be made only after careful consideration by persons who understand the significance of the findings and can identify pertinent highlights for action.

In some areas, procedures have not been established for collecting basic information, and consequently health agencies are unable to observe certain important local trends. The absence of such information is a deficiency, and health jurisdictions should make every effort to develop adequate records and procedures for the collection of pertinent service statistics.

Indexes for Interpreting Data

The principal quantitative indexes of the tuberculosis problem and selected indexes of the

With this report, the Working Group on Service Programs of the Public Health Conference on Records and Statistics has completed five documents on the collection, analysis, and interpretation of service statistics. These documents are intended to aid in preparing data for planning, administering, and evaluating various public health services.

The first report, appearing in *Public Health Reports* in June 1956, page 519, introduced the series and set forth basic principles governing service statistics. Subsequent reports dealt with health supervision of infants and preschool children (July 1956, page 705), health services for children of school age (September 1956, page 917), and home accident prevention programs (June 1957, page 494).

In preparing this fifth report on statistics for tuberculosis control programs, the working group was assisted by several consultants with special experience in programs of tuberculosis control. The guide had almost reached its present form when the conference was reconstituted in March 1958 as a consultative and collaborative study program. Aided by the Tuberculosis Program, Public Health Service, a study group of the new conference completed the work. Their revisions were based on comments received after distribution of the mimeographed release (Document 438, reproduced by the National Office of Vital Statistics, Public Health Service, De-

partment of Health, Education, and Welfare, Washington 25, D.C.).

Under the title "A Guide for the Collection, Analysis, and Interpretation of Service Statistics in Tuberculosis Control Programs," the document has the endorsement of the following organizations: American Association for Vital Records and Public Health Statistics, the Committee on Public Health Administration and the Statistics Section of the American Public Health Association, and the Association of State and Territorial Directors of Local Health Services. It was endorsed by the president of the American Trudeau Society. The Association of State and Territorial Directors of Public Health Nursing recommends that the guide receive careful attention.

Dr. James E. Perkins, managing director of the National Tuberculosis Association, one of the agencies providing technical consultation in developing the guide, believes that it will be helpful to those responsible for the collection and analysis of meaningful statistical data on tuberculosis. The Committee on Tuberculosis Nursing of the National League for Nursing and the National Tuberculosis Association regards the guide as an important and worthwhile step forward in measuring progress in tuberculosis control.

scope and effectiveness of program operations are given in this section. These indexes can be constructed from the data items listed under Statistical Information, sometimes from only a pair of items and sometimes from several. For example, the first index under Program Operations, casefinding coverage, is in effect a summary obtained by analyzing items selected from Baseline Data, as well as from Data on Program Operations.

The validity of the indexes will depend on the completeness of the component statistical items and the reliability of the statistical procedures used in relating one item to another. If a valid comparison is to be made between indexes for different time periods or different areas, it is

essential that they be based on comparable data uniformly defined, collected, and analyzed.

For most of the indexes, the period of measurement is 1 year; however, in some localities another time interval may be preferred. For example, in areas where there are few cases of tuberculosis, or few deaths, it might be advisable to use 3- to 5-year averages in order to minimize the effects of random fluctuations.

Many of the indexes have been used in reports prepared by various health agencies, such as Reported Tuberculosis Data, released periodically by the Public Health Service. It is therefore possible for a health department to obtain data on other communities for comparison with its own performance.

Many health departments may not find it feasible to tabulate the data required for all the indexes, while others may need additional indexes. The list is intended to be a reasonable compromise.

Definition of Problem

Mortality: Annual rate of tuberculosis deaths per 100,000 population.

Incidence: Annual rate of newly reported active cases per 100,000 population. (The term "active case" in this paper refers to cases classified as active and probably active, as explained in reference 1.)

If casefinding and reporting are reasonably adequate (as indicated by the ratios under Casefinding, below, and in other ways), this rate provides an estimate of the rate at which new cases are actually developing in the population. Where casefinding and reporting are consistent from year to year, this rate reveals the trend of known incidence.

Prevalence of known cases: Rate of known active cases per 100,000 population as of a specified date.

This rate has limited meaning when the percentage of cases for which medical examination reports are overdue is high.

Rate of all known cases, regardless of clinical status, per 100,000 population as of a specified date.

These figures on known prevalence can serve as an estimate of the community's tuberculosis problem. Estimates of total prevalence of tuberculosis cases, including unknown as well as known cases, can be obtained only by special studies, not from service statistics.

Prevalence of infection, as measured by the tuberculin test (2): Percent reacting among all ninth grade students tuberculin tested (and read) during year.

This index can be used to observe long-term trends in the prevalence of infection in the community. It can also be used to identify areas of a city where infection rates tend to be the highest. Lower grades are not suggested because in many parts of the country it is necessary to test adolescents in order to obtain a rate high enough to fulfill these two functions. Higher grades are not recommended because these students are progressively less representative of the community population of similar age.

In some cities the prevalence of sensitivity among first grade children is still great enough to serve these purposes. In such localities it would be useful to test

first grade children as well as those in the ninth grade since the sensitivity level among the younger children is more likely to indicate recent conditions of exposure to infection.

The prevalence of infection among adults should be determined by special studies, and testing of this group should progressively become a part of the regular program of periodic assessment of the tuberculosis problem. In many areas today testing of adults is needed more than testing of school children.

Program Operations

CASEFINDING

Coverage: Of the population in specific high-risk groups or areas, percent screened during year.

Followup of screening program suspects: Of tuberculosis suspects, percent for whom followup was completed within 6 months after the screening program either by establishment of a diagnosis (tuberculosis, other chest disease, or essentially negative) or by other disposition.

Contact examination: Of contacts to new active cases reported during year, percent examined by end of year.

Effectiveness of casefinding programs: Of new active cases reported during year, percent discovered by organized casefinding efforts: chest X-ray surveys, tuberculin testing programs, or contact examination.

Of new active pulmonary cases reported during year with extent of disease specified, percent classified as minimal.

If extent of disease is not specified in a large proportion of cases, the meaning of this item is severely limited.

Of new active cases reported during year, percent first reported by death certificate or at time of death.

USE OF HOSPITALIZATION

Of new active cases reported during year, percent hospitalized for treatment of tuberculosis at any time during year.

Of all known active cases as of a specified date, percent in hospitals for treatment of tuberculosis on that date.

SUPERVISION OF UNHOSPITALIZED CASES

Prescribed treatment: Of unhospitalized active cases on a specified date, percent with no

known drug therapy or other specific treatment prescribed.

Of unhospitalized inactive cases, percent with no known drug therapy currently prescribed.

Medical supervision: Of total unhospitalized cases as of a specified date, percent for which medical examination report is overdue.

This index should also be constructed for active and activity undetermined cases.

Of unhospitalized active cases as of a specified date, percent with no bacteriological examination report within preceding 6 months.

Public health nursing supervision: Of total unhospitalized active and activity undetermined cases as of a specified date, percent with no public health nursing visit within preceding 6 months.

Of unhospitalized active cases with current positive bacteriological findings as of a specified date, percent with no public health nursing visit within preceding 6 months.

Of new active cases reported during year, percent visited by public health nurse within 1 month of report to health department.

A low rate may be caused by lack of prompt referral to the nursing division.

Of cases discharged from hospitals during year, percent visited by public health nurse within 1 month of date of discharge.

A low rate may be caused by the hospital's delay in notifying the health department.

Status on hospital discharge: Of active cases discharged from hospitals during year, percent with positive bacteriological findings at time of discharge.

Of active cases discharged during year, percent discharged against medical advice.

Medical social service: Of unhospitalized active cases referred to social service during a specified period, percent who have received social service during same period.

Vocational rehabilitation: Of cases referred for rehabilitation service during year, percent accepted for rehabilitation.

Terms, Data Sources, Tabulation

Standard terminology. Uniform application of standard terminology is essential in the collection of data. Unless all items that go to make up a total are chosen according to one

definition, the total will not be valid. If different definitions are used at different times or in different places, totals will not be comparable from one time to another or from one place to another.

Definitions for most of the basic terms used in tuberculosis control may be obtained from Diagnostic Standards and Classification of Tuberculosis (2) and from the Report and Recommendations of the Committee on Morbidity Reporting (1). The committee's recommendations are reprinted on the back of the Semiannual Tuberculosis Morbidity Report, a Public Health Service required report (PHS Form 1394, revised 1-52), and in the National Morbidity Reporting Manual of Procedures (3).

Sources of data. Most data in tuberculosis control come from basic records (clinic and hospital, laboratory, nursing, case register, for example), and these must be adequate, accurate and properly correlated if they are to supply the necessary information. Statistical analysis cannot produce results more accurate than the primary data. Public health agencies can do much to refine and improve their own source documents in tuberculosis control and to improve communications with other agencies and institutions. Joint planning can frequently reduce the number of record forms needed and make each more effective and serviceable.

Data on newly reported cases can be obtained from the official morbidity reports and summaries which are made once or twice a year by most local health departments.

The source of prevalence data is the tuberculosis case register, or equivalent records, for which information must be obtained routinely from places providing services to the patient, such as clinics, private physicians, laboratories, hospitals, and nursing offices. Keeping current information on each patient's status should be part of routine operating procedure in maintaining good case supervision. Techniques will vary for obtaining statistical reports reflecting the extent of supervision and current clinical status of known tuberculosis patients.

Mortality data are available from the analysis of death certificates filed with local registrars of vital statistics and forwarded to offices

Counts by cause of death are made by the State vital statistics offices. Information regarding persons with tuberculosis who die of other causes, as well as tuberculosis cases reported for the first time by death certificate, must come from the cooperative efforts of the tuberculosis control and vital statistics offices.

Population figures which are more recent than those reported in the United States decennial census publications may be available from special local censuses or from population estimates periodically prepared by a State or local agency. Each year the May issue of *Sales Management* magazine contains current population estimates and pertinent information on economic status for all counties and major cities.

The hospital facilities office of the State health department can supply information on the number and kinds of hospitals within its jurisdiction, including bed capacity and other pertinent data. Similar information can be found each year in the August issue of *Hospitals* (Journal of the American Hospital Association) and the Public Health Service publication, *Tuberculosis Beds in Hospitals and Sanatoria*. State nursing and medical associations, as well as other professional organizations, and special surveys made by professional organizations provide information on numbers and specialties of medical and paramedical personnel.

Tabulating methods. Tabulating methods must be considered when record forms are designed since the two are related. In selecting the most appropriate method, volume is an important factor. Hand tabulations are not necessarily the least expensive or most accurate. For a moderate quantity of records the marginal punchcard system, with its many applications and flexibility, merits consideration. Machine tabulation is usually recommended for large volume because of its greater speed, accuracy, and flexibility.

Statistical Information

The items listed below provide the information necessary for program measurement as outlined in the section on indexes, plus supplemental information which will permit further

assessment of the tuberculosis problem and adequacy of program activities.

Baseline Data

HEALTH JURISDICTION

1. Total population as of specified date.
2. Population of specified high-risk groups (for example, special geographic areas; admissions to general hospitals; residents and employees of mental, penal, and other "resident" institutions; lower economic groups; and older age groups).
3. Population breakdown by age, sex, race, marital status, urban-rural, geographic location, occupation, and economic status.
4. Health facilities and resources, including (a) number of beds available to tuberculosis patients in general and tuberculosis hospitals; (b) number, location, and patient capacity of chest clinics; (c) number and type of medical and paramedical personnel.

MORTALITY

1. Number of tuberculosis deaths for the year.
2. Tuberculosis deaths by age, sex, race, marital status, geographic location of residence, occupation, and economic status.

INCIDENCE

1. Newly reported active cases for year, including active and probably active in both pulmonary and nonpulmonary classifications of disease (1), by source of report: (a) private physicians, (b) tuberculosis hospitals (public and private), (c) general hospitals, (d) chest clinics, (e) mental institutions, (f) death certificates, (g) transferred from other States, (h) transferred from other local health jurisdictions, (i) other.
2. Newly reported active cases for year by method of discovery (source of referral), such as chest X-ray surveys, tuberculin tests, contact examination, health examination, and self-referral.
3. Newly reported active cases for year by age, sex, race, marital status, geographic location of residence, occupation, and economic status.
4. Newly reported active cases for year by form and extent of disease.

PREVALENCE OF KNOWN CASES

Known tuberculosis cases as of a specified date classified by clinical status: (a) active or probably active (group A); (b) activity undetermined or not specified; (c) inactive or probably inactive but requiring public health supervision (open file only).

PREVALENCE OF INFECTION

1. Total number of persons tuberculin tested (and read), by method of test, by age or school grade, sex, and race, for each population group that warrants special investigation.

2. Number read, by size of induration (in millimeters), by the same classifications.

3. Number considered "positive," by the same classifications.

Data on Program Operations

CASEFINDING

Data should be collected for each population group that warrants special investigation, by age, race, and sex if possible, and for appropriate periods.

Chest X-ray Surveys

1. Number of persons screened.

2. Number of persons with screening films read as suspected: (a) tuberculosis, (b) cardiovascular disease, (c) tumor, (d) other non-tuberculous chest disease.

3. Followup of tuberculosis suspects.

(a) Number diagnosed as tuberculous and reported as new cases, by clinical status.

(b) Number diagnosed as essentially negative for tuberculosis.

(c) Number diagnosed as having nontuberculous disease, by type of disease.

(d) Number with followup incomplete or pending.

Tuberculin Testing

1. Number of persons tested and read.

2. Number of reactors.

3. Number of reactors X-rayed.

4. Number of persons found with suspected tuberculosis.

5. Number diagnosed and reported as new cases, by clinical status.

Contact Investigation

1. Number of close contacts (household and

any other with a history of close contact) to newly reported active and probably active cases.

2. Number of contacts examined by end of year by X-ray or tuberculin tests: (a) diagnosed as tuberculous and reported as new cases, by clinical status; (b) diagnosed as negative for tuberculosis; (c) with incomplete followup.

HOSPITALIZATION

Of new active cases reported during year, number hospitalized for treatment at any time during year.

Hospitalization for diagnosis or observation alone should not be included in this count.

CASE SUPERVISION: TUBERCULOSIS REGISTER

1. Total number of cases in tuberculosis register or its equivalent (current file only) as of specified date:

(a) Cases hospitalized for tuberculosis: (i) in tuberculosis hospitals (including tuberculosis wards of general and chronic disease hospitals); (ii) in mental and penal institutions (only active cases and inactive cases on anti-tuberculosis drug therapy).

(b) Cases hospitalized for other conditions.

Include cases not being treated for tuberculosis but presumably being given appropriate periodic examination by the institution; for example, inactive cases not on drug therapy in mental, penal, and chronic care institutions. If the hospitalization is of short duration—for an appendectomy, for instance—count in the following item.

(c) Cases not hospitalized.

Include those presumed to be outside institutions, plus tuberculosis patients residing in certain institutions, such as nursing homes, who are not being supervised for their tuberculosis by the institution. It is, of course, the responsibility of the health department to see that these patients receive necessary medical supervision and treatment.

2. Clinical status of cases not hospitalized.

(a) Active and probably active.

(b) Activity undetermined (or activity not stated), that is, only those cases which cannot be classified as probably active or probably inactive.

(c) Inactive and probably inactive with current drug prescription.

(d) Inactive and probably inactive without current drug prescription.

3. Medical followup of cases not hospitalized, by clinical status.

of vital statistics in State departments of health. Counts by cause of death are made by the State vital statistics offices. Information regarding persons with tuberculosis who die of other causes, as well as tuberculosis cases reported for the first time by death certificate, must come from the cooperative efforts of the tuberculosis control and vital statistics offices.

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4. Health facilities and resources, including (a) number of beds available to tuberculosis patients in general and tuberculosis hospitals; (b) number, location, and patient capacity of chest clinics; (c) number and type of medical and paramedical personnel.

MORTALITY

1. Number of tuberculosis deaths for the year.
2. Tuberculosis deaths by age, sex, race, marital status, geographic location of residence, occupation, and economic status.

INCIDENCE

1. Newly reported active cases for year, including active and probably active in both pulmonary and nonpulmonary classifications of disease (1), by source of report: (a) private physicians, (b) tuberculosis hospitals (public and private), (c) general hospitals, (d) chest clinics, (e) mental institutions, (f) death certificates, (g) transferred from other States, (h) transferred from other local health jurisdictions, (i) other.
2. Newly reported active cases for year by method of discovery (source of referral), such as chest X-ray surveys, tuberculin tests, contact examination, health examination, and self-referral.
3. Newly reported active cases for year by age, sex, race, marital status, geographic location of residence, occupation, and economic status.
4. Newly reported active cases for year by form and extent of disease.

2. Analysis of tuberculosis casefinding through tuberculin testing, based on the number of reactors rather than on persons tested, showing yield by age, sex, and race; also by length of time from discovery of infection to emergence of disease.

3. Comparison of stage of disease of new active cases found in tuberculin testing programs with those found by chest X-ray surveys of similar groups of persons.

4. Comparative cost of finding active cases by tuberculin testing surveys and by chest X-ray surveys.

5. Nontuberculous disease found in tuberculosis casefinding programs.

6. Completeness of case reporting.

7. For deaths in a specified time period, time intervals between date of morbidity report and date of death.

8. Extent to which known active unhospitalized patients are following treatment recommended.

9. Disease reactivations.

10. Hospital admissions and discharges within a given time period:

(a) Average length of stay as related to diagnosis on discharge, age, and sex.

(b) Admission diagnosis compared with discharge diagnosis as related to length of stay and other factors.

(c) Length of time between hospital discharge date and receipt of referral by the health department.

11. Analysis of social factors which have contributed to nonacceptance of medical recommendations by patients with tuberculosis, and the extent to which resolution of social problems has led to an acceptance of treatment.

12. Extent to which patients who received social service had their problems resolved compared with those who did not receive social service, with analysis of reasons for nonresolution in both categories.

13. Analysis of other than social factors which have contributed to nonacceptance of medical recommendations.

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- (2) Diagnostic standards and classification of tuberculosis. 1955 edition. New York, National Tuberculosis Association, 1957.
- (3) U.S. National Office of Vital Statistics: National morbidity reporting manual of procedures. Section X. Morbidity reports of tuberculosis. Washington, D.C., U.S. Government Printing Office, January 1956, p. 24.

Training in Epidemiology

A course in applied epidemiology will be offered at the Communicable Disease Center, Public Health Service, Atlanta, Ga., May 4-8, 1959.

This course is designed primarily for physicians who investigate disease outbreaks or who have administrative responsibility for such investigations. It serves as a review for experienced health administrators and as a guide to physicians new to the public health field.

Emphasis is placed on developing an understanding of the use of epidemiological techniques to solve preventable disease problems. Lecture-discussion sessions and audiovisual aids are used in the presentations. Group participation is stressed through group solution of epidemiological problems, seminars, and panel discussions.

Further information and application forms may be obtained from: Chief, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga. Attention: Chief, Training Branch.

(a) Report of medical examination (X-ray or clinical) not overdue.

(b) Report of medical examination overdue:

- (i) last examined less than 12 months ago;
- (ii) last examined more than 12 months ago.

4. Bacteriological status of active and probably active cases not hospitalized.

(a) Positive at last report within past 6 months.

(b) Negative at last report within past 6 months.

(c) Status undetermined in past 6 months.

5. Unhospitalized cases with drug therapy currently prescribed, by clinical status.

CASE SUPERVISION: NURSING SERVICES

1. Of unhospitalized tuberculosis cases at a specified time, number not visited (home, office, or clinic) by public health nurse within preceding 6 months, by clinical and bacteriological status.

2. Of new active cases reported during year, number visited (home, office, or clinic) by public health nurse within 1 month of date of official morbidity report.

3. Of cases discharged from hospitals during year, number visited (home, office, or clinic) by public health nurse within 1 month of discharge, by clinical status (excluding deaths, transfers, nontuberculosis cases, and persons hospitalized only for diagnosis).

4. Total number of visits (home, office, or clinic) to all tuberculosis patients during year, by purpose of visit (guidance or instruction, therapeutic care, collateral service).

OTHER NURSING SERVICES

Total number of suspects, contacts, and associates of reactors who receive public health nursing service during year.

TUBERCULOSIS HOSPITAL DATA

1. Percentage of available tuberculosis beds occupied as of a specified date.

2. Average cost per patient day.

3. Average length of stay.

4. Number of patients discharged from tuberculosis hospitals during year (excluding transfers, nontuberculous cases, and persons hospitalized only for diagnosis) by

(a) Clinical status and type of discharge.

(b) Clinical status and bacteriological status.

(c) Recommended treatment: drug therapy only; rest only; both drug therapy and rest.

MEDICAL SOCIAL SERVICE

1. Number of active tuberculosis patients in current caseload referred to social service during a specified period.

2. Number of these patients served by medical social workers by end of specified period, either through direct service (casework or consultation) to the individual patient or indirectly through interagency activities.

VOCATIONAL REHABILITATION

- Number of tuberculosis patients referred by health department for vocational rehabilitation to both official and voluntary agencies during year: (a) accepted for rehabilitation; (b) not accepted (either agency or patient nonacceptance); (c) acceptance pending.

SPECIFIC PREVENTION

1. Number of BCG vaccinations administered during year to (a) persons in families with tuberculosis, by age and race; (b) persons in other groups (nurses and medical students, for example), by age and race.

2. Number of persons receiving chemoprophylaxis as of a specified date, by age and race.

EDUCATION AND TRAINING

1. Types of inservice training for public health professional workers and others.

2. Types and number of training sessions for volunteer workers.

3. Number of contacts with and presentations to organized civic and service groups.

Special Studies

Where a sustained program is well developed and additional statistical information can be utilized, greater attention can be given to special phases of tuberculosis control activities. Studies can be undertaken to develop more definitive statistical information and to provide greater refinement in measurement. The following are suggested as special study topics:

1. Prevalence of tuberculin sensitivity among adults.

viruses. Serums from 103 chickens in 3 flocks on the outskirts of the city were tested.

The second survey, conducted in January 1957, was designed as an indicator of immunity levels among the human population. Serum specimens were obtained from a total of 340 volunteers representing all age groups, all parts of town, and all economic classes. The specimens were then tested for the presence of complement-fixing antibodies against the SLE virus by the Virus and Rickettsia Laboratory of the Communicable Disease Center, Public Health Service. One hundred of these specimens, selected to give equal distribution among the different age and sex groups, were tested for HAI antibodies against both SLE and WEE viruses. Also, 96 of the 100 were tested for neutralizing antibodies against SLE. Antibody levels were classified as significant, equivocal, or insignificant by use of the following criteria:

Classification	HAI	Test SN ¹	CF
Insignificant-----	<1:10	0-32	<1:2
Equivocal-----	1:10	33-50	1:2
Significant-----	>1:10	>50	>1:2

¹ Neutralization Index.

There were no attempts at virus isolation from mosquitoes nor was the predominant mosquito species identified, the reason being that cold weather had brought about an end to the mosquito season by the time the investigation began.

Epidemiological investigations revealed that the outbreak of human cases apparently began on July 28 when a farmer from Fruita, 10 miles west of Grand Junction, became ill with symptoms of fever, severe headache, stiff neck, nausea, malaise, weakness, generalized muscle pain, and hand tremor. On July 29 he was hospitalized. The same day, a 3-year-old girl in Grand Junction became ill with similar symptoms. From that point the cases increased in number until October 15. By that time 31 cases had been seen by physicians in Grand Junction and Fruita. Thirty of these were among residents of Grand Junction.

The peak of the epidemic curve was reached in late August, and a secondary rise occurred during the first 2 weeks of November as 3 more

cases of encephalitis were reported. The etiology of these last three is unknown. Serologically they were not arthropod-borne encephalitis.

All age groups were affected, with the largest number of cases (seven) in the group from 20 to 29 years of age (table 1). Clinical illness was almost equally divided between males and females.

Serum was collected from 20 of the 31 patients through which the illness of 3 of these 20, or 15 percent, was confirmed serologically as SLE. An additional 13 cases, or 65 percent, were classified as serologically suggestive of SLE. Attempts to demonstrate antibodies against the common encephalitides (SLE, western equine encephalitis, eastern equine encephalitis, lymphocytic choriomeningitis, and mumps) all failed in serum samples from the remaining four, or 20 percent, of the cases.

Table 1. Comparison of the age distribution of clinical cases of encephalitis with that of the population which had measurable antibody levels against the SLE virus, Grand Junction, Colo., 1956

Age groups (in years)	Clinical cases		Survey		
	Num- ber of cases	Percent of cases	Percent with CF anti- bodies	Percent with HAI anti- bodies	Percent with neutral- izing anti- bodies
0-9-----	3	9.7	1.8	20.0	20.0
10-19-----	4	12.9	4.4	20.0	22.2
20-29-----	7	22.6	4.0	0	15.0
30-39-----	6	19.3	0	0	21.1
40-49-----	3	9.7	0	0	0
50-59-----	2	6.5	9.1	20.0	20.0
60 and over--	6	19.3	4.8	0	0
Total-----	31	100.0	2.9	5.0	16.7

The serum surveys showed that 1 percent of the 100 humans and of the 103 chickens surveyed had significant antibody levels against WEE. In contrast, 16.5 percent of the chickens and 0 to 12.5 percent of the humans, depending upon the test used, had significant antibody levels against the SLE virus (table 2). The percentage of each human age group with antibodies against the SLE virus can be

St. Louis Encephalitis Outbreak During 1956 In Grand Junction, Colo.

LUTHER E. GIDDINGS, M.D., LEE W. SMITH, M.S.,
MARGARET E. N. BEAVER, M.D., and CLARENCE A.
SOOTER, Ph.D.

THE FIRST sizable outbreak of St. Louis encephalitis among humans in the Rocky Mountain area occurred in 1956 in Grand Junction, Colo., and the surrounding valley on the western slope of the mountain range.

The area had experienced only scattered cases of St. Louis encephalitis since the disease was first recognized in St. Louis in 1933 (1). The midwest and the Pacific coast, however, had had occasional outbreaks and frequent sporadic cases of both St. Louis encephalitis and western equine encephalitis, two of the three arthropod-borne encephalitides which are found in this country. Eastern Colorado, with its dry, rolling plains, falls into the midwestern epidemiological pattern, but little is known about the natural occurrence of St. Louis encephalitis and western equine encephalitis in the mountains, canyons, and valleys of western Colorado, in which Grand Junction lies.

A city of 18,500 people, Grand Junction is at the junction of the Colorado and Gunnison Rivers in Grand Valley, which spreads over 15 by 30 miles at about 4,500 feet above sea level. The valley is encircled on three sides by pla-

teau and bordered on the fourth by desert. Numerous canals, irrigation ditches, and small swampy patches along the borders of the river contribute to the city's mosquito-breeding potential.

The outbreak of 1956, which occurred farther above sea level than any previously reported, was part of a statewide rise in activity of the St. Louis encephalitis (SLE) virus. Thirty-one cases of encephalitis were reported from Grand Junction and from the surrounding parts of Mesa County. There were no fatalities.

Epidemiological Methods

As each case of encephalitis occurred it was reported to the Mesa County Health Department by a private physician. Epidemiological information was then collected on each patient by a physician-epidemiologist or by a public health nurse from the department.

Attempts were made to collect an acute-phase serum specimen soon after the onset of the disease. Convalescent-phase serum specimens were generally collected between 3 and 8 weeks later. All paired serum specimens were tested with the serum neutralization (SN) test, the complement fixation (CF) test, and the hemagglutination-inhibition (HAI) test for antibodies against the SLE and western equine encephalitis (WEE) viruses. Single convalescent-phase specimens were tested with the HAI test only.

A case was classified as "confirmed" if a fourfold rise in titer was obtained with the CF or HAI tests or if a tenfold rise in neutralization index could be demonstrated. A case was classified as "suggestive" if the illness was clinically compatible with the disease and a CF titer of at least 1:8 or an HAI titer of at least 1:80 could be demonstrated in either a single convalescent-phase specimen or in paired specimens where a rise in titer was not demonstrable.

After the outbreak of human encephalitis had run its course still more information was desired. Accordingly, two serologic surveys were performed. The first was conducted in November 1956 among yearling chickens for HAI antibodies against the SLE and WEE

At the time of the study, Dr. Giddings and Mr. Smith were with the Encephalitis Investigations Unit, Greeley Field Station, Communicable Disease Center, Public Health Service, Greeley, Colo. Dr. Giddings is currently a resident in pediatrics at Salt Lake County General Hospital, Salt Lake City, Utah, and Mr. Smith is with the Graduate School of Public Health of the University of Pittsburgh. Dr. Sooter continues serving with the Encephalitis Investigations Unit of Greeley Field Station. Dr. Beaver is director of the Mesa County Department of Public Health, Grand Junction, Colo.

as many specimens were used in the CF test as in either of the others. CF results from those serum specimens which also were tested with the HAI and SN tests appear much closer to results of the three tests in age distribution of inapparent infection. However, to omit CF results from the remaining 240 samples would be to sacrifice accuracy unnecessarily.

An explanation for the low level of inapparent infection during the 1956 outbreak of clinical encephalitis has not been found. None of the 340 serums tested had a CF titer greater than 1:2. A control serum from a girl who had clinical SLE in August 1956, when tested, unidentified, with the other samples had CF antibodies at a titer of 1:64. It can be assumed from this that recent inapparent infection, had it occurred, would have been obvious from results of the CF test. The fact that inapparent infection is not greatest in age groups with the largest number of clinical cases also makes it appear that the cases of inapparent infection probably occurred sometime prior to the 1956 outbreak.

HAI results show that there was more SLE activity than WEE activity in Grand Junction in 1956. The fact that 16 times as many yearling chickens and 3 times as many humans had HAI antibodies against SLE would be indicative of this. Evidence exists that the virus of SLE was also more active than that of WEE in other parts of Colorado in 1956. Not only was the SLE virus isolated much more frequently from pools of *Culex tarsalis* mosquitoes in Weld County in eastern Colorado, but scattered cases of SLE were reported among humans along the east slope of the mountains and on the eastern plains where no cases of WEE were confirmed.

Summary

An outbreak of encephalitis among humans in Grand Junction, Colo., and the surrounding

valley during 1956, part of a statewide increase in activity of the St. Louis encephalitis virus, was the first outbreak of the disease in the Rocky Mountain area.

Thirty-one cases, with no fatalities, were reported in the outbreak, which occurred farther above sea level than any previously reported.

In a serologic survey of 340 persons, it was found that 16.7 percent had neutralizing antibodies against SLE.

A serologic survey of yearling chickens showed that the SLE virus was far more active than the western equine encephalitis virus in Grand Junction in 1956.

Differences in results from the complement fixation, hemagglutination-inhibition, and serum neutralization tests evolved from the use of different sample sizes in each test and from variations in the life of the antibodies sought in each test.

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Table 2. Results of serologic surveys for SLE in Grand Junction, Colo., 1956

Species	Test used	Number tested	Titers					
			Insignificant		Equivocal		Significant	
			Number	Percent	Number	Percent	Number	Percent
Human	CF	340	330	97.1	10	2.9	0	0
Human	HAI	100	95	95.0	3	3.0	2	2.0
Human	SN	98	80	83.3	4	4.2	12	12.3
Chicken	HAI	103	84	81.6	2	1.9	17	16.5

compared with the age distribution of the clinical cases in table 1.

Discussion

The epidemic curve and age distribution of the outbreak roughly paralleled those in the original outbreak of SLE in St. Louis, Mo., in 1933 and in a more recent outbreak in the Rio Grande Valley in Texas in 1954 (3). In each, the epidemic curve started upward in late July or early August, reached a peak in late August, and then declined through September and October, and in each outbreak the majority of the cases were in the middle and older age groups. The attack rate in the Grand Junction outbreak of 162.3 per 100,000 compares with that of the original outbreak in St. Louis of 100 per 100,000 and the more recent Texas outbreak, 163.9 per 100,000, but is far below that in Calvert City, Ky., in 1955 in which the attack rate was 865.6 per 100,000.

In the light of an expected mortality of 5 to 30 percent from SLE (4), the fact that none of the 31 patients died is unusual. Observations by some workers have shown that SLE in humans is usually somewhat milder in the west than in the midwest. These workers postulate that the reason for this is the presence of a strain of SLE virus in the west which is less pathogenic for man than the midwestern strains (personal communication from Dr. Carl M. Eklund).

Approximately 12.5 percent of the population tested for previous inapparent infection had neutralizing antibodies against the SLE virus at a significant level. This is comparable with the 11.8 percent found in Weld County in north-

eastern Colorado in 1951 (5). In the Weld County survey few under the age of 20 years had significant antibody levels, whereas in Grand Junction nearly half of those with antibodies were less than 20 years of age. There are a number of possible explanations.

The marked differences in the serologic survey results according to the test used were due partially to the fact that neutralizing antibodies against the SLE virus persist for a considerable length of time, possibly more than 10 years, while CF antibodies persist only for a period of several years (6). HAI antibodies are thought to have a duration somewhere between those of the other two. Consequently, when all three tests are run, it is possible to obtain some indication of the activity of the SLE virus in a given area over a period of possibly 10 years. Accordingly, survey results in table 1 might be interpreted thus: the SLE virus was moderately active in humans in the years 1954-56 since 2.9 percent of the population have CF antibodies. A larger number, 5.0 percent, have HAI antibodies so it is likely that the virus was also moderately active in the years 1951-53. Since a still larger number, 16.7 percent, have neutralizing antibodies, it can be assumed that this moderate level of activity goes back beyond 5 years, possibly as far back as 10 years. It must be realized, however, that a single year with heavy activity between 1946 and 1951 could bring about the difference in results between the serum neutralization test and the other two tests. There is no record of such activity having occurred prior to 1956.

Another reason for the differences in survey results is that samples of different sizes were used in the three tests. More than three times

A total of 135 medical, dental, engineering, science, nursing, and veterinary students from 120 approved 4-year professional schools spent the summer months of 1958 in Public Health Service facilities under the Service's training program.

« »

By following faithfully a prescribed self-help program at home, most arthritis victims can fight off the crippling caused by the disease, according to a new 24-page publication, *Home Care in Arthritis*, issued by the Arthritis and Rheumatism Foundation.

« »

The Texas State Health Department has published OH-1A, a procedural guide for reporting excessive radiation doses; OH-1B, an advisory guide on local preparations for and handling of excessive radiation doses; OH-1C, changes in basic philosophy on maximum permissible radiation exposures; OH-16A, a procedural guide for sanitary use of portable water coolers; and OH-27, a list of registered professional nurses active in industrial nursing in Texas, 1958.

« »

J. C. Maruzzella and P. A. Henry report in the *Journal of the American Pharmaceutical Association* that 100 aromatic oils used in perfumes possess antimicrobial properties against fungi and bacteria.

« »

The New York City Health Research Council was recently established with a budget of \$600,000. Its immediate targets will be problems of aging, maternal and child care, mental illness, heart disease, environmental hazards, and patient care. This is the first time a medical and public health research program has been supported solely by local tax funds.

« »

The 1958 report of the field teaching conference of the Southern Branch of the American Public Health Association is now available. Address inquiries to Miss Ruth W. Hay, Chairman, Field Teaching Conference, Box 229, Chapel Hill, N.C.

Health department cooperation with the fire marshals to help overcome hazards in schools, homes for the aged, private hospitals, kindergartens, and the like is reported by H. George Henderson-Watts, from the Saanich and South Vancouver Island Health Unit, British Columbia.

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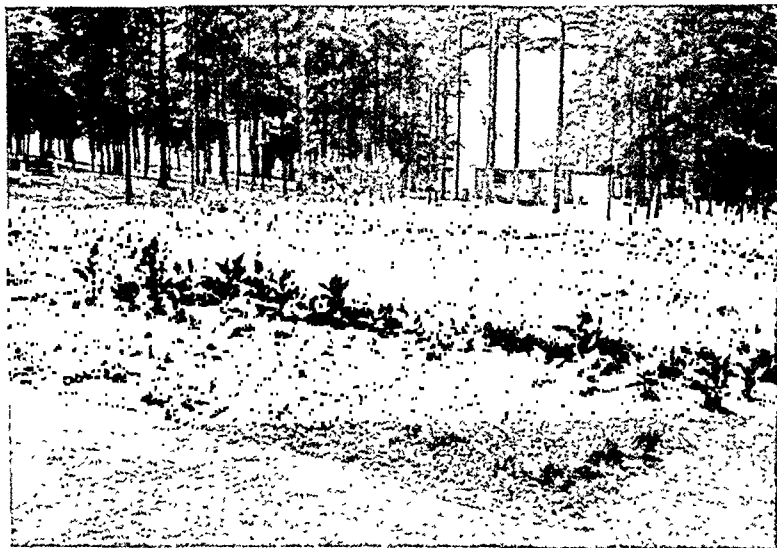
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gardens, park benches, and a half-acre vegetable garden. To the right in the illustration is a brick tool shed constructed by the patients. In the foreground is a flower garden built on a clay mound resulting from excavations for a hospital building. The soil was conditioned with pine needles and leaf mold gathered by the patients.

Many of its mental hospitals are using similar reclamation projects with therapeutic benefit to patients, according to the Veterans Administration.

Signs

and

Symptoms

of trends in public health

Colorado's 54,000 old-age pensioners are guaranteed \$100 a month income, and are permitted to go to any hospital and receive the same treatment as regular patients at State expense.

If the aged person cannot live alone, he goes to a convalescent or nursing home, and contributes all but \$5 of his monthly income; the State pays the balance. A sum of \$10 million has been set as the annual allocation to finance the program; Blue Cross and Blue Shield administer it. State officials believe that revenues earmarked for pensions will exceed the cost of the program.

« »

About 95 percent of all pedestrian deaths occur in residential areas rather than in congested business sections, AAA reports in a 163-page booklet entitled "Planned Pedestrian Program," a community do-it-yourself plan to halve pedestrian deaths.

« »

Death rate from accidents among children 1 to 4 years old dropped 18.4 percent between 1949 and 1956.

« »

An agreement between the Public Health Service and the automobile industry provides for the Service to concentrate on effects of auto exhausts on health while industry concentrates on developing engineering devices to reduce exhausts.

« »

Trioptic lenses have been developed with alleged magnifications of from 300 to 2,000 percent. They are said to promise help for 500,000 partially blind in the United States.

Dr. Leonidas H. Berry, Chicago specialist in internal medicine and originator of a plan for the rehabilitation of narcotic addicts, won the National Medical Association's distinguished service award.

« »

Not more than 1 million of the Nation's 57 million cars on the highway today are equipped with seat belts, reports the Cornell University Medical College auto crash injury research project. (See *Public Health Reports*, May 1958.)

« »

About 95 percent of the good drivers who have accidents do so because they become bored and distracted, according to Joseph Zabelski, safety education consultant, Michigan Automobile Club.

« »

New York City's Police and Health Departments are conducting a joint 6-month study on the effects of alcohol, barbiturates, tranquilizers, and allergy-relieving drugs on driving ability and traffic accidents.

« »

Successful treatment of alcoholics produces the new problem of a wife with "no one to mother," comments Dr. Herman Feifel, Veterans Administration Mental Hygiene Clinic, Los Angeles. The clinic has been treating nonalcoholic wives simultaneously with alcoholic husbands.

« »

The World Health Organization's global battle against disease is described by Albert Deutsch, in *Public Affairs Pamphlet No. 265*.

A demonstration program in Tahiti has attacked filariasis. Diethylcarbamazine was used to destroy the parasite in the blood stream and to control mosquito carriers. The program is a joint effort of the French Overseas Medical Service and the University of California, Los Angeles, Medical School.

« »

The Washington, D. C., commissioners have been asked by the District of Columbia Welfare Department and the District's Nursing and Convalescent Home Association to conduct a survey of nursing homes to consider licensing requirements, adequacy of treatment, and facilities. Only the largest homes are required to be licensed at present. The association has asked the welfare department to raise monthly payment for indigents in nursing homes from \$110 to \$210.

« »

Dr. James F. Benedict, Erie County (N. Y.) medical examiner, asserts that plastic dry-cleaning bags used as mattress covers caused two infant deaths this year. The plastic apparently adhered to the nose and mouth so tightly that it prevented breathing.

« »

Colostomy and Ileostomy Care, a 55-page guide of practical information for nurses, has been published by the Cuyahoga Unit, Cleveland, Ohio, of the American Cancer Society.

« »

Upcoming Meetings: Midwest Institute on Alcohol Studies, June 21-26, Western Michigan University, Kalamazoo, Mich.

• Air pollution control association, June 22-26, Statler-Hilton Hotel, Los Angeles, Calif.

• First international conference on mental retardation, July 27-31, Eastland Hotel, Portland, Maine.

• Sixth international exhibition-convention of health technicians, June 9-12, Parc des Expositions, Porte de Versailles, Paris.

• Thirty-sixth annual conference of the American Physical Therapy Association, June 21-26, Hotel Leamington, Minneapolis, Minn.

A total of 135 medical, dental, engineering, science, nursing, and veterinary students from 120 approved 4-year professional schools spent the summer months of 1958 in Public Health Service facilities under the Service's training program.

« »

By following faithfully a prescribed self-help program at home, most arthritis victims can fight off the crippling caused by the disease, according to a new 24-page publication, *Home Care in Arthritis*, issued by the Arthritis and Rheumatism Foundation.

« »

The Texas State Health Department has published OH-1A, a procedural guide for reporting excessive radiation doses; OH-1B, an advisory guide on local preparations for and handling of excessive radiation doses; OH-1C, changes in basic philosophy on maximum permissible radiation exposures; OH-16A, a procedural guide for sanitary use of portable water coolers; and OH-27, a list of registered professional nurses active in industrial nursing in Texas, 1958.

« »

J. C. Maruzzella and P. A. Henry report in the *Journal of the American Pharmaceutical Association* that 100 aromatic oils used in perfumes possess antimicrobial properties against fungi and bacteria.

« »

The New York City Health Research Council was recently established with a budget of \$600,000. Its immediate targets will be problems of aging, maternal and child care, mental illness, heart disease, environmental hazards, and patient care. This is the first time a medical and public health research program has been supported solely by local tax funds.

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EVALUATION OF A MOUSE TEST FOR THE STANDARDIZATION OF THE IMMUNIZING POWER OF ANTI-RABIES VACCINES¹

By KARL HABEL, *Assistant Surgeon, United States Public Health Service*

The ideal animal test for the standardization of any vaccine should be done under conditions either similar to or at least comparable to those under which the vaccine is used clinically in human beings. The technique of performing the test should be simple and there should be no procedure in which individual differences of the technician might cause variation in results. The time required to complete a test is of practical importance since the material being tested cannot be released for clinical use until successfully meeting the requirements. Therefore the duration of the test should be sufficiently

short so as not to subtract materially from the life of the vaccine. Results should be unequivocal and subject to but one interpretation. On repetition of identical tests the results should be uniform. The test animals used should be easily available, inexpensive, and easily cared for in the laboratory. The material used in testing the immu-

nity produced by the vaccine must be uniform in its potency, or the test must be so arranged that any changes in these properties will be revealed in the results. These are the requirements of the ideal test.

Since rabies vaccine was first used it has been subjected to many types of experimental tests to determine its immunizing properties and, therefore, its efficacy in the Pasteur treatment of human beings. This subject has been reviewed recently by Webster (1), who emphasizes the general lack of positive results in the light of statistical analysis of the published protocols.

In general, the following types of tests have been used.

1. *Injection of rabies virus into central nervous system (subdural, intracerebral, intraocular) followed by a course of vaccine treatment (1).*— In this method results have been quite consistently negative, the same mortality usually occurring among the vaccinated and control animals. This is easily understandable, since the direct introduction

¹ From the Division of Biologics Control, National Institute of Health.

(1473)

AUGUST 16, 1940, pp. 1473-1487

Dr. Karl Habel in this classic mouse protection test establishes for an efficient rabies vaccine the minimum requirement of protection against at least 1,000 MLD (minimum lethal dose).

RESIDUAL FUMIGANTS

Their Potential in Malaria Eradication

WILLIS MATHIS, B.S., RICHARD W. FAY, Ph.D.,
H. F. SCHOOF, Ph.D., and K. D. QUARTERMAN, M.P.H.

RESIDUAL fumigants offer a new technique of vector control which is potentially capable of revolutionizing the insecticidal approach to malaria eradication.

Current malaria eradication programs depend primarily on interrupting the transmission of the disease through the use of residual insecticides, chiefly DDT and dieldrin. Although considerable success has been achieved with this method during the past decade, similar accomplishment in some areas is being hampered by (a) development of vector populations resistant to these insecticides, (b) variation in the efficacy of residues caused by the type of surface to which they are applied, (c) destruction or removal of the insecticidal deposits by replastering, washing, or other modifications of the treated surfaces, and (d) variation in the behavior of the mosquitoes. Consequently, a method which would reduce or eliminate the influence of any of these factors would hasten the achievement of the ultimate goal of global malaria eradication.

The authors are with the Technical Development Laboratories of the Communicable Disease Center, Public Health Service, in Savannah, Ga. Mr. Mathis is a medical entomologist, Dr. Fay is assistant chief, and Dr. Schoof is chief of the Biology Section. Mr. Quartermann is chief of the laboratories. (Manuscript received for publication March 23, 1959.)

That certain toxicants, such as lindane, DDVP, Diazinon, and malathion, possess fumigant properties is an established fact. Moreover, in recent studies of the effectiveness against *Anopheles quadrimaculatus* of malathion deposits on walls, it was noted that 75 to 100 percent of the mosquitoes remaining in the entrance cages attached to the outside of the animal-baited huts were killed (1).

The death of these mosquitoes was presumed to result from malathion vapor being carried to the entrance cages from the interior of the huts by air currents. The magnitude of the fumigant action of organophosphorus compounds against mosquitoes was first detected accidentally through the unexpected mortality of mosquitoes in use as "check" insects in laboratory tests. Apparently, they were killed by fumes from an unopened bag of fly bait containing malathion and DDVP. To confirm this premise, two cages of *A. quadrimaculatus* were placed 1.5 and 3.5 feet above floor level in a small room (5 by 9 by 10 feet) at sites approximately 7 to 10 feet from the same unopened bag of bait located at floor level in an adjoining room (10 by 14 by 10 feet). The rooms were unoccupied and closed to the exterior, and the connecting door remained open. All specimens died within 2.5 hours. The fact that the unopened bag contained a plastic liner emphasized the mobility of the vapor.

To evaluate this fumigant action under less favorable conditions, the tests described below were conducted in an unoccupied two-room house and in two small huts.

House Test

Each room was 13 by 12 by 8 feet. One contained an exterior door and a window, and the other, two windows. All these and an interior door between the rooms were fully open. Cages of both susceptible *Aedes aegypti* (400 adults) and *Musca domestica* (200 adults) were placed in five positions in the two rooms as follows: room I-A, sheltered corner; room I-B, in open window; room I-C, above interconnecting door; room II-D, exposed corner; and room II-E, sheltered corner.

Four 5-pound bags of fly bait composed of 2.0 percent malathion and 0.5 percent DDVP were placed in room I on the floor, 5 to 8 feet from cage sites A, B, and C, and 13 and 17 feet respectively from sites D and E. The bait containers were double-paper bags lined with plastic. One was opened, and the others remained sealed. All specimens were exposed for 1 hour, during which time a gentle breeze (estimated 10 m.p.h.) passed through both rooms. After 24 hours, mortality for female houseflies was 21 to 24 percent at cage sites A, B, and C, and 2 and 0 percent at sites D and E. For female mosquitoes, the values were 95 to 99 percent at sites A, B, and C, and 64 and 52 percent at sites D and E.

Hut Tests

Each hut (8 by 8 by 8 feet) had 2 windows (3 by 3 feet) on opposite sides, both of which remained open during the entire experiment. In hut I, a single 5-pound open bag of bait containing 2 percent malathion and 0.5 percent DDVP was placed in the center of the floor; in hut II, three open 5-pound bags of the same bait were located one each at the apexes of a triangle (2 ft.) near the center of the floor. One hundred female *A. quadrimaculatus* were released in each hut at 3 p.m. 1 week after the baits were installed, and at weekly intervals during the next 3 weeks. The morning following each release, all specimens, both living and

dead, were collected and held for 24- and 48-hour mortality determinations. Results showed 100 percent mortality for each of the four weekly tests in each hut. The tests were discontinued after the fourth week.

During the fourth week, caged specimens (25 females per cage) were exposed for the same time interval at floor level, and at 2, 4, and 6 feet above the floor. In hut I, all specimens at floor level and at 2 feet were dead within 48 hours. At the 4- and 6-foot levels, 44 and 88 percent respectively were killed. In hut II, mortality was 100 percent for all positions. However, mortality at floor level in an untreated check hut was also relatively high (24 percent).

Subsequent tests were made to determine whether malathion or DDVP, or the combination of the toxicants, was responsible for the residual toxicity. Separate formulations of 2 percent malathion plus 0.5 percent DDVP, of 0.5 percent DDVP, and of 2.0 percent malathion were prepared in a granular inorganic material (A). A 5-pound lot of each formulation was bagged in a paper container, and the bag was left open and placed in the center of the hut floor. Both "free-flying" and caged *A. quadrimaculatus* were introduced into each hut at 3 p.m., 3 hours after the bait was installed.

The following morning all mosquitoes, whether "free-flying" or caged, were dead. With the combination of malathion and DDVP and with DDVP alone, all the specimens were knocked down 3.5 hours after exposure began. With malathion alone, only a few specimens were down after 4.5 hours of exposure.

Tests on the residual potency of these formulations were precluded because of the onset of cold weather.

Discussion

The potential of residual fumigants for controlling house-frequenting adult mosquitoes, although obviously successful in producing a high mortality for 4 weeks, has not been explored fully in these preliminary tests. Further studies under laboratory and field conditions are now in progress to determine which toxicant or combination of toxicants is most effective, the

duration of residual action under various environmental conditions, efficient methods of formulation in small, lightweight units, and the toxicological hazards. The possibility of toxicological hazards to the occupants of treated dwellings represents a principal question concerning the practical use of the fumigants. This aspect will require extensive study before the technique can be put into general practice.

If the use of residual fumigants proves feasible, it is readily foreseeable that this technique could result in important monetary savings by simplifying malaria eradication operations. Manpower requirements would be reduced drastically; the need for spraying equipment, with its attendant burdens of maintenance, as well as problems currently encountered with wettable-powder formulations, would be minimized; and other difficulties associated with residual spraying, such as the sorption of residues by certain mud surfaces, objections to the unsightliness of residues on some walls, and the modifications of treated surfaces by replastering, washing, and the like,

would be eliminated. Although mosquitoes appear more susceptible to fumigant action than houseflies, the technique may be effective also against other types of house-frequenting insect vectors and pests.

Because of the many potential advantages which the residual fumigant technique may offer in malaria eradication and in the control of other mosquito-borne diseases, it is hoped that the encouraging results of these preliminary tests will stimulate other workers to investigate the many questions which must be answered before the technique may be adopted for general use.

REFERENCE

- (1) Mathis, W., and Schoof, H. F.: Organophosphorus compounds as residual treatments for adult mosquito control. *Am. J. Trop. Med.* 8:1-4, January 1959.

EQUIPMENT REFERENCE

- (A) Perlite, Tennessee Products and Chemicals Corp., Nashville, Tenn.

Alaskan Research Advisory Committee

An Interagency Research Advisory Committee has been formed by representatives of the Alaska Department of Health, the U.S. Air Force Arctic Aeromedical Laboratory, and the Public Health Service's Alaska Native Health Service and Arctic Health Research Center. Its purpose is to assist scientific investigators in medical and allied fields who wish to perform research in Alaska.

The committee is prepared to aid investigators sponsored by a recognized institution by explaining local situations, helping solve logistic difficulties, and making available Alaskan facilities.

Persons desiring such assistance should write to E. M. Scott, Chairman, Interagency Research Advisory Committee, Arctic Health Research Center, Box 960, Anchorage, Alaska.

Live Attenuated Poliomyelitis Vaccine

For many years, the possible use of a live attenuated poliomyelitis vaccine, that is, a virus which has been grown in animals or eggs until it has lost its disease-producing potential without losing its immunizing ability, has been discussed. For more than 7 years, the problem has been under serious investigation.

The Salk vaccine, now in use and giving good results in protecting against paralytic poliomyelitis, is made from killed virus.

The main advantages visualized for a vaccine made from live attenuated virus are: (a) longer lasting immunity—although the Salk vaccine is believed to provide protection for some time, the actual duration of immunity is not yet known because it has been in use for such a short time; (b) ease of administration, with the live virus given orally instead of by injection; and (c) presumably lower costs of production.

At the present time three sets of strains are under investigation. These are most readily identified by the names of their developers, the Sabin, Lederle, and Koprowski strains, named respectively for Dr. Albert Sabin of the University of Cincinnati, Lederle Laboratories, and Dr. Hilary Koprowski of Wistar Institute of Philadelphia. The name of Dr. Herald Cox, of the Lederle Laboratories, is also associated with the Lederle strains.

Each set consists of three type strains. These sets of strains have now been administered to large numbers of persons in an attempt to determine: (a) their ability to produce adequate and durable levels of antibody, and (b) their safety in general use.

No untoward results have been

reported in relation to these studies. Stated in this way, the facts appear impressive. It must be remembered, however, that the data these studies were designed to collect have not yet been fully assembled, analyzed, or made public.

The Public Health Service is following these developments closely. Our Division of Biologics Standards of the National Institutes of Health, for example, is conducting laboratory investigations aimed at characterizing the type strains. These investigations are of importance because the Service may be asked some day to license the products.

I also have appointed an ad hoc committee composed of outstanding experts in this field to keep me advised of developments with respect to live attenuated poliomyelitis vaccines. This committee consists of Dr. Roderick Murray, chairman, director of the Division of Biologics Standards, National Institutes of Health; Dr. David Bodian, Johns Hopkins University; Dr. William McD. Hammon, University of Pittsburgh School of Public Health; Dr. Alexander Langmuir, Public Health Service, Communicable Disease Center, Atlanta, Ga.; Dr. Joseph Melnick, Baylor University, and Dr. John R. Paul, Yale University Medical School.

This committee has met twice and considered all information now available on these vaccines. The committee finds a number of important issues remain to be answered or resolved before the live attenuated poliomyelitis vaccines can be considered other than in the experimental stage.

These issues cover such points as: apparent differences in the ability of the different strains to invade the nervous systems of experimental ani-

mals; transmission of virus from vaccinated persons to others; feasibility of feeding the three type strains simultaneously; effect of viruses in the intestinal tract, other than polioviruses, on the development of immunity to poliomyelitis; validity of surveillance of populations inoculated to date.

The committee has felt some concern because some of the trials of live attenuated poliomyelitis vaccine have not followed the recommendations of the World Health Organization Expert Committee on Poliomyelitis. It also has been concerned by apparent differences in the virulence for the nervous system of some of the virus strains being used. This aspect of the problem needs further study.

The experience thus far indicates that encouragement should be given to carefully conducted, small-scale studies designed in such a way that the laboratory and epidemiological surveillance could produce results upon which a judgment could be made.

Large-scale trials of live attenuated poliomyelitis vaccine in the United States are considered unproductive because so large a proportion of the population already has been immunized with killed vaccine.

The decision to permit such trials in other nations is, of course, one for their health and medical authorities. However, because the experimental vaccines are made in the United States and because our ad hoc committee has been studying reports on them, I feel that such information as we have should be made public so that not only our people but the peoples of other nations can have all current available information as exists on which to form their opinions and base their decisions.

Homemaker Service in New Jersey

MARIAN R. STANFORD, M.D.

COMMUNITY homemaker service in New Jersey is a locally sponsored nonprofit activity to place women workers in households in which they are needed because of illness or disability or other family emergency. The placement of the worker is made by the local agency after evaluation of the home situation. The hours of service vary according to the family's need. Payment for the service is an obligation of the family or of a community agency if the family cannot afford to pay.

Homemakers are mature women selected for their personality, dependability, good health, and special interest in working with families in which there is a family crisis. After screening and acceptance by a local committee, they take a standardized 19-hour training course. Those who complete the course satisfactorily receive a certificate. The course is sponsored and financed by the New Jersey State Department of Health's division of chronic illness control and administered through the extension division of Rutgers, the State University. Upon acceptance for service by the agency, the homemakers are given physical examinations, including chest X-rays and blood tests. They receive cards indicating they are in good health and they wear standard uniforms. While employed, they are covered by workmen's compensation, public liability insurance, and social security. This is arranged by the sponsoring agency.

What Homemakers Do

Homemakers do light housekeeping. They are not expected to do a huge family wash nor the spring or fall housecleaning. Nor are they a new category of domestics to do cleaning.

Fundamentally, their task is to assist the members of the family in maintaining a smoothly running household. They may set the house in order by straightening up, dusting, washing the dishes, and keeping the patient's room clean and fresh. They may plan or actually do the marketing, depending on the availability of other personnel in the family. They may prepare meals for the family, including lunches for the children and the breadwinner. They also prepare meals for the patient with due regard to the instructions of the physician. (Some orientation to the special dietary needs of sick persons is given in the preliminary training course which is a prerequisite to employment.) Homemakers provide essential care for young children and encourage well members of the family to carry their share of responsibility.

Homemakers are specifically advised that they are not to do bedside nursing or other nursing duties. Thus they complement rather than substitute for or compete with a community visiting nurse or practical nurse service.

The homemaker develops on the job. She is periodically supervised on the job. She is required to report on each case and confer frequently with her supervisor. These reports and conferences provide evidence of her competence, her reaction to illness and family situations and to the work she is performing. She aids the agency in evaluating the needs of the family and the length of service required. Her observations often are helpful to the supervisor and the physician; physicians and families volunteer

Dr. Stanford is director of the division of chronic illness control, New Jersey State Department of Health, Trenton.

information to the agency about the homemaker's competence and performance.

Effects of the Service

Community homemaker service helps to prevent a breakdown in the orderly management of the household because of illness or other family emergency. It prevents inadequate supervision of children; poor family nutrition; disproportionate burdens on some members of the household which could produce fatigue, worry, anxiety, resentment, and hostility; loss of efficiency; absence from work of employed members of the household; and absence from school of older children. Physicians say the service has prevented temporary breakup of the household, removal of sick persons from familiar surroundings to institutions, and placement of children with relatives or in foster homes.

From the standpoint of the community, the homemaker service may free more hospital beds for the acutely ill, may decrease demand for custodial facilities, and may eliminate the cost of avoidable institutional care.

History of Development

The promotion of community homemaker service in New Jersey is an outgrowth of the State health department's interpretation of its responsibilities under the Prevention of Chronic Illness Act of 1952 (chapter 102, Public Laws of 1952). This State legislation established within the department a division of chronic illness control. The division was directed to assume responsibility for activities directed toward the prevention, early detection, and control of chronic illness and the rehabilitation of the chronically ill.

Section 26: 1A-97-b of the Prevention of Chronic Illness Act provides that the division shall "plan for the provision of adequate visiting nurse and housekeeping aid services by appropriate public or private agencies throughout the State, to the end that the nursing and medical care being furnished to the chronic sick in their own homes shall be improved in every manner possible."

It is not the function of the New Jersey State Department of Health to provide direct serv-

ices to the consumer; its function is to strengthen the community's capacity to provide such services. The division's effort helps to stimulate the development of community supportive services; the division does not directly provide that service through its own staff and personnel.

Prior to the creation of the State Consultant Committee on Community Homemaker Service, there were three homemaker services operating in New Jersey, two of them of the traditional type. These two were attached to family service agencies and provided help on a full-time basis to distressed families on the rolls of the agency, using an average of two homemakers in each agency.

In 1950, the third homemaker service, specifically planned to meet the needs of long-term patients, was started in Essex County under the sponsorship of the Essex County Medical Society. The primary objective was to lessen the emotional and financial toll of long-term illness by making it possible to care for the patient in his own home. Service was provided initially to the chronically ill. Later, homemaker service was provided to some persons with short-term illness, especially when it seemed likely that such help might prevent the illness from being prolonged.

The Essex County service served as a pattern for additional agencies. Recruiting homemakers from middle-aged and older women constituted a new approach. It provided satisfying work to a group which was otherwise finding it difficult to obtain employment in the labor market. The limited time basis on which the service is given, usually 2 to 6 hours per day, makes it particularly suitable for some women who might not feel physically capable of full-time employment.

In 1953, Dr. Daniel Bergsma, State commissioner of health, appointed the State Consultant Committee on Community Homemaker Service to promote the development of community homemaker services throughout the State. He asked the committee to develop a plan for community homemaker service specific enough to be used as a practical guide to interested communities but flexible enough to be adaptable to local conditions. He also asked it to develop a

Homemaker Films

"Home Again" was prepared for the New Jersey State Department of Health and the American Heart Association. It may be purchased from the Mental Health Film Board, Service Department, 267 West 25th Street, New York 1, N.Y. The price is \$145. Copies of the filmstrip "Enter Hope" are unavailable for distribution outside of New Jersey.

course of study to help women who seek such employment to become suitable homemakers. Members of this committee have included physicians, lawyers, nurses, nutritionists, social workers, teachers, persons trained in informational techniques, and persons with considerable experience in organizational work. The first chairman, who served for 4 years, was a member of the Temporary Committee on the Chronic Sick appointed by the Governor to study needs and recommend legislation. This committee drafted the Prevention of Chronic Illness Act.

The State consultant committee, which originally had 10 members, now has 40. The committee has subcommittees working on such areas of activity as intake criteria, procedures, resources, fees, insurance, publicity, and financial support. The department maintains membership with the National Committee on Homemaker Service.

A handbook, which presented a plan for community homemaker service, was one of the first projects and was published by the State department of health. It has received wide circulation. Another pamphlet is entitled "A Training Course in Homemaker Service." Shorter, descriptive, promotional brochures were also developed for distribution among potential users of the services.

A statewide institute and, subsequently, regional institutes on homemaker service acquainted community leaders with the service and how it operates.

As a result of conferences between the division of chronic illness control, its consultant committee, and officials of the New Jersey State Department of Banking and Insurance, a special category of "homemaker" was set up by

the banking and insurance department, enabling insurance carriers to charge an equitable rate which is adjusted each year on the basis of claims.

The division of chronic illness control and its consultant committee explored with the New Jersey State Department of Labor and Industry the status of the volunteer agency under employment laws in the event a small fee for administration was added to the hourly rate paid to the homemaker herself. (The hourly rate to the homemaker is usually \$1.25.) The New Jersey State Department of Labor and Industry concluded that the community homemaker service, as a voluntary nonprofit group, was exempt from regulations which apply to commercial employment agencies, provided the agency files the proper exemption forms.

Promotional Aids

Promotional aids, in addition to printed material, include a color filmstrip with sound recording and a 30-minute film. The filmstrip, entitled "Enter Hope," is a true story in pictures of community homemaker services in New Jersey. It shows the training homemakers receive, the kinds of service they give, and the benefits that accrue to the patient, the aged person, and the family group.

The film "Home Again" reveals the valiant efforts of a father to keep his family together when the mother is in the hospital because of a heart attack. For the first time in an American film, the role of the homemaker service is dramatized. The film also demonstrates how homemaker service by a supervised team approach can keep a family together in time of crisis and how it can help relieve emotional tensions and stresses and strains that impede recovery of the chronically ill.

Members of the State consultant committee, through their widespread and influential contacts, have inspired and helped to arrange local meetings on community homemaker service, and have spoken at many of them. The division of chronic illness control of the State department of health has fostered the program by underwriting the cost of the homemaker training course administered by Rutgers University. The division provides temporary grants-in-aid

National Homemaker Conference

About 300 persons attended the National Conference on Homemaker Services held February 10-11, 1959, in Chicago.

The conference was called to encourage development of programs to help families maintain themselves at home when illness or other major crises occur. Sponsored by 26 national voluntary agencies and 8 units of the Department of Health, Education, and Welfare, it was described as the most representative conference on homemaker services ever held in this country. About one-half of the participants had attended preconference study groups in New York City, Chicago, San Francisco, Cleveland, Raleigh, Denver, and Trenton.

The concept that homemaker services should be available to any family or individual on the basis of need, regardless of income or age, was set forth.

Agreement was reached that if homemaker services are to be extended nationwide, a partnership of agencies at Federal, State, and local levels is required.

Dr. David E. Price, chief, Bureau of State Services, and Assistant Surgeon General of the Public Health Service, in an address on the health-welfare partnership, said, "The mutual interest of the health

and welfare professions in extending homemaker services affords a good illustration of how closely health change and social change bind us in an inextricable partnership. The longer lifespan, a health gain, has given us an older population with consequent increase in chronic ills. These long-term disabilities in turn bring economic and emotional problems which can lead to more physical illness. Smaller families, working wives, and the change to an urban, apartment civilization—a social change—often give us no one to care for the bedridden and homebound. And so it goes, round and round, health-welfare, welfare-health. In the middle stands the homemaker, a personification of our partnership."

Dr. Price summarized, "I have noted a growing trend in health departments toward a research approach to public health practice. We are encouraging this in every way possible. At the State and local level, fresh ways of meeting health needs are being sought, trying to fit methods to people, rather than forcing people into rigid patterns of established procedure. In such a search, homemaker services should prove of interest to many."

in some instances to enable community homemaker services to acquire either part-time or full-time directors to strengthen supervision of the service in the home or to demonstrate countywide coverage and underwrites the cost of educational materials, training aids, and State conferences.

The training course for homemakers, given in various municipalities to make it more convenient for women to attend, includes consideration of these topics: what homemaker service is; working with people; homemaker and family relationships; accident prevention and safety in the home; family life in relation to food and home care; understanding children, the elderly, and mental illness; understanding

what occupational therapy is; and agency procedures.

There are now 12 established homemaker services in New Jersey, and more than 600 women have been trained as homemakers since June 1954. Most of the services are working toward a county service. Activity in four other counties gives promise of favorable development. From a population standpoint, more than half of the residents of New Jersey now have established homemaker services available to them. Geographically, more than one-third of the State is thus served. One objective of the health department and of its State consultant committee is to have such a service available to all families in New Jersey who need it.

LITTER

and the Public Health

HOMER N. CALVER, B.S.

THE FIRST street cleaning department in America was established in Philadelphia in 1750 by Benjamin Franklin, according to the American Public Health Association. Some 200 years later, in 1953, Keep America Beautiful was incorporated in New York City; it is the first national organization specifically set up to combat litter.

The growing litter menace had for some time been the concern of many kinds of national and local, official and voluntary organizations. Several of them were already valiantly fighting uncoordinated uphill battles to clean up our highways, streets, streams, parks, lakes, and beaches. These individual efforts brought temporary improvement here and there, but Keep America Beautiful undertook to wage continuous warfare on a national scale, emphasizing a new concept: the concept of prevention. This approach to the problem was designed to reduce the litter and therefore the enormous cost of cleanup and collection. It may be expected to produce more lasting results.

Mr. Calver, one of the founders of Keep America Beautiful, Inc., and former secretary of the American Public Health Association, is a consultant in public health and public relations in New York City.

The campaign against litter is a campaign against soil and water pollution. Early public health programs against indiscriminate pollution of soil and water with body wastes first emphasized the need for collection of these wastes (privies). Later, public health workers became concerned with transportation (sewerage). Refuse disposal was in general tackled in reverse order. Only lately have their efforts focused on the problem of getting the refuse properly accumulated in the first place. Litter might be defined as unaccumulated refuse, so the campaign against litter is in effect a campaign for the accumulation of rubbish at central points from which it may be more economically collected for transportation and disposal.

When environments are untidy, the health department is usually blamed, even though policing the environment may not be its responsibility. Every health department must therefore concern itself with the prevention of litter if for no other reason than to win public support for its whole program. In addition, however, public health workers have a direct stake in litter prevention as a way of reducing disease and accidents.

Rubbish promotes the breeding of rats, flies, and mosquitoes. It causes accidents, particu-

larly on highways. Cars swerve to avoid rubbish. Tires are cut, causing blowouts. Paper blows against windshields, obscuring vision at a critical moment. Reflections at night from a piece of glass or metal may be confused with the reflection from a traffic marker or mistaken for the eye of an animal. In the *Milwaukee Journal* of December 8, 1957, the Associated Press reported an estimate of 750 to 1,000 persons killed and 100,000 injured each year as a result of striking or swerving to avoid objects on highways. Refuse on beaches, in lakes and streams, in swimming pools, and in parks and playgrounds can cause cuts and abrasions which sometimes result in serious infections, and refuse on sidewalks and steps causes falls. Uncollected rubbish is the source of many fires, some of which cause injury and death. Litter in a lake or river can puncture the hull of a boat traveling at high speed, or damage a rudder or propeller. Such accidents can be the precursor of death.

There are also other attributes of litter. Dr. Justin M. Andrews, at the third annual conference of the Keep America Beautiful Advisory Committee in New York City in 1956, pointed out that "litter is frequently the surface symptom of a diseased environment." When the sanitarian sees this symptom he must be as concerned about seeking and removing the cause as the physician is about seeking the cause of a rash on the body. Here one might ask, what is the cause of litter? Is there an epidemiology of litter?

Without doubt, one cause of litter is mass production which makes it cheaper to discard and replace than to repair or re-use many things. Other causes are modern sanitary packaging, increased leisure time, increased mobility, and a food supply so abundant that we can waste much food. It is a wry thought that many of the attributes of a higher level of consumption are the very things which are impairing our health and the esthetic quality of our environment.

But there are additional causes. Some of the obvious ones are the lack of adequate trash receptacles at convenient points and infrequent and careless collections. But perhaps there are deeper causes as well. There would seem to be

some evidence that littering is communicable. For example, a beach, park, or highway which is already littered invites more litter. If some members of a family are in the habit of littering, other members of the same family are likely to have the same habits. There is more litter in some communities than in others. There are probably social, economic, regional, sex, and age factors related to litter production, just as there are surely seasonal variations in the amount of litter produced. These variables need to be identified. Pin maps showing pounds or bushels of litter per capita by areas might be illuminating in a study of the epidemiology of litter.

It is not sufficient to assume that general programs of education, publicity, and propaganda, or appeals to pride and pocketbook, or stricter laws better enforced will prevent litter over the long run. With litter, as with any other public health hazard, we cannot plan and focus programs of prevention until we have more information than we have now as to its causative factors.

The public health profession is uniquely equipped to solve some of the basic questions. Meantime it will have to deal with the problem of litter by empirical methods of law enforcement and education, just as it had to deal with yellow fever, cholera, and typhoid fever before the causes and routes of infection of these diseases were known. In this case, however, it is doubtful that an anti-litter serum can be developed or that if it were developed it would be used by the family physician.

Although the challenge is formidable, empirical methods are already producing remarkable results in many localities.

Philadelphia

In Philadelphia, for example, the junior sanitation unit has given new life to the Philadelphia Clean-Up Committee. The committee's block organization plan had met with little success until the boys and girls were formed into units in the schools by the city's police sanitation officers. Each member pledges to keep himself clean at all times and to aid in keeping his home, school grounds, and neigh-



New York Times photograph

Litter and rubbish in a 20-by-100-foot lot in Brooklyn presented not only an eyesore but a fire and safety hazard to the neighborhood.

borhood neat and litter free. Saturday mornings as their neighbors watch, the junior sanitation "cleaner-uppers"—who are easily identified by their white caps lettered "clean up"—work with verve and pride. Their contribution is not only material but inspirational as it stirs parents and neighbors to join in the crusade.

Today, Philadelphia has more than 975 organized blocks where flowers bloom in doorway and backyard gardens, in porch boxes and fence boxes, and even in sidewalk boxes—concrete troughs set against the houses and planted with climbing roses to brighten the once shabby streets. Block captains, a new aristocracy of citizens, work seriously, diligently, and enthusiastically with their groups, sparked with the contagious zeal of youth. The junior sanitation unit will also prove to be a reservoir of future leadership in the anti-litter movement.

Savannah

Savannah, Ga., started with a women's committee; a caricature of "Pelican Pete," a bird indigenous to the Georgian coast that could be used as a symbol to speak for the committee; and 30,000 litterbags which had been donated by a paper corporation. The slogan was Keep Beautiful Savannah Clean.

The litterbags created enough interest so that when trash receptacles in which to place them



New York Times photograph

The lot became a garden of flowers, shrubs, and vegetables, with a 10-foot maple tree, after transformation by school children.

after use were needed, individuals and business firms contributed them willingly. Window stickers of Pelican Pete were distributed, and 10,000 automobile stickers were given out by gas stations and banks. Silver cups were awarded to schools where the grounds were improved. So dedicated were boys and girls in the cleanup movement that mothers who became anti-litter committee members testified at meetings that no longer would they dare to throw trash from car windows lest they incur junior's censure.

Enlisting aid from all sources—civic, service, and fraternal organizations, and business and industry—the committee also appeared before the city council, county commissioners, police department, and health and sanitation department to ask their cooperation. Their efforts have brought about ordinance changes as well as all-out support of the community's continuing anti-litter program.

Indianapolis

"Yard Parks," Indianapolis' title for the year-round litter control program, is structured in special divisions with a "trouble-shooter" for each to investigate public complaints and take proper action. The divisions, such as allied florists, drug stores, and public health, make Yard Parks an integral part of all community activities, enlisting the support of every citizen

through his work, organization membership, or hobbies.

Litter prevention is being taught as the "yards beautiful" course in all public, parochial, and private schools in the city and county with full support of the educational phase by community groups and PTA units.

San Antonio

San Antonio, Tex., long famed throughout the country for its palm-lined avenues of lovely homes and artistically landscaped parks, deteriorated during World War II into a ghost of its former beauty. Littered streets, run-down houses with unkempt lawns, weed-grown lots, and neglected parks where plants and shrubs had been allowed to die had changed the face of the city.

Littering had become communicable. Lack of civic pride and indifference were deeply entrenched in the public consciousness. No civic group came forward. One man, O. P. Schnabel, spearheaded the movement to check littering. With very little support he called on the newspapers, radio, and television stations to arouse the citizenry. Some financial help came from business firms aware of the potential value of a clean city.

Throughout San Antonio were heaps of accumulated household trash. As no regular trash removal was made by the city, Mr. Schnabel and his committee initiated an annual trash haul. Private firms donated a truck and helpers, and in the first year, 1949, thousands of tons of trash were removed from homes and yards. These annual hauls not only saved citizens a million dollars in private trash-toting fees, but awakened them to the realization that their town was depreciating. More residents joined the campaign, and in 1951 San Antonio won its first National Cleanest Town Award in a contest sponsored by the National Clean Up, Paint Up, Fix Up Bureau in Washington, D.C. Since then, San Antonio has won an award every year, receiving the National Grand Award in 1954.

Today there is a Beautify San Antonio Association which cooperates with the chamber of commerce and other public and civic organiza-



Dunsmuir News photograph

Littered shoreline blights a beauty spot along California's McCloud River. Thousands of youth and adult groups have joined the movement to enhance and preserve the Nation's scenic beauty.

tions. More than 750 trash cans have been placed at strategic locations to encourage citizens to keep streets and parks clean. Elementary and high school students have conducted essay and poster contests and devised school checklists which have resulted in cleaner school grounds. Homes have been beautified through pressure exerted by children upon their parents. The city health department regularly notifies owners of unkempt lots. If the owners fail to respond, the department cleans up the debris and bills them for the cost.

As a long-range plan for making America litter free, officials of the Beautify San Antonio program advocate that future automobiles should have built-in trash receptacles. They believe that 90 percent of Americans will cooperate if they have a place to deposit litter while driving. Meantime, they are encouraging the use of disposable litterbags and other portable containers.

Four-Point Formula

These four cities are not unique. Each became aware that it was faced with a problem, and met the situation as it best suited the individuality and resources of the community. These and other cities, currently dedicated to the fight against litter, are finding effective the four-point formula for litter prevention of Keep America Beautiful. It includes:

- Public education to cultivate individual responsibility, civic pride, and good citizenship habits.
- Participation in public interest projects for cleaner, more attractive surroundings.
- Adequate collection and disposal facilities.
- Adoption and proper enforcement of State

and local legislation to penalize willful offenders.

There is no magic formula for any city; but the plan most likely to succeed is a full-time, continuous program of litter control supported by all the interested groups in the community, with the full cooperation and participation of government.

If communities throughout the country join the effort, perhaps in succeeding generations the "inherited" tendency toward the disease of litter will be markedly reduced.

Project guides for leaders on various phases of litter prevention are available from Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

Epidemiological Notes

Rabies

Although only six cases of rabies in man were reported in 1958, it is worth noting that half of them were traced to bites by animals other than dogs. One case each was traced to a bite by a skunk, a fox, and a bat. This is a slightly higher proportion of infections from wildlife sources than for the previous 5 years. The relatively lesser importance of dogs in the etiology of infection in man parallels the decline in number of rabid dogs reported and an increasing number of rabies infections reported in wild animals. About 1940, 85 percent of all cases of animal rabies reported were in dogs and about 3 percent in wild animals. Since that time, cases of rabies in dogs have declined nearly 65 percent, while in wild animals there has been almost a tenfold increase in numbers reported.

The measures for control of rabies in dogs are well established; vaccination and elimination of stray dogs. On the other hand, the complex problem of controlling infection in wild animals continues to be formidable. The apparently increasing amount of rabies in wildlife is a threat not only to the health of man but also to domestic animals. The annual economic loss in cattle and horses infected with rabies by wild animals is considerable.

The extent of the task of preventing rabies in man cannot be measured by the small number of deaths. Any calculations must include the approximately 60,000 persons who receive injections of vaccine annually because of exposure to rabid animals or to animals suspected of having rabies. Investigations have been underway to develop vaccines that will not induce serious reactions but will stimulate adequate antibody responses. The optimum use of hyperimmune serum is being studied, and the development of a gamma globulin is regarded as a possibility. Pre-exposure vaccination is being considered for certain individuals, such as veterinarians and mailmen who often have contact with biting dogs.—
DR. CARL C. DAUER, *medical adviser, National Office of Vital Statistics, Public Health Service.*

Total serum cholesterol values obtained from a sample of American Indians on five reservations are significantly lower than those from a Cleveland clinic population.

Serum Cholesterol Levels in American Indians

SIDNEY ABRAHAM and DAVID C. MILLER, M.D.

AN OPPORTUNITY to examine the level of total serum cholesterol of Indians residing on five reservations in the United States was afforded when the Public Health Service, in cooperation with the U.S. Department of Interior, conducted the Indian Health Survey from October 1955 through June 1956.

Such an examination is of epidemiological interest, since an early study reported infrequent coronary heart disease among the Navajos which prompted an examination by subsequent investigators (1, 2). They found in a small sample of hospitalized Navajos a low serum cholesterol level when compared with that of a clinic group from the Cleveland population, although the Navajo dietary fat intake apparently was not much less than that of the general diet. These findings are contrary to still inconclusive evidence that a high fat intake is reflected in a high concentration of serum cholesterol in the blood and, perhaps, in an increased tendency to develop atherosclerosis (3, 4). It was theorized from these findings that

genetic factors, rather than dietary factors, were the principal cause of the low serum cholesterol level and low coronary heart disease occurrence among the Navajos. Other investigators, in studying different groups of the Navajo population, were not impressed that the Navajo mean serum cholesterol level was particularly low. They concluded that the mean level which they observed does not support the hypothesis that the low prevalence of coronary heart disease among the Navajos is a result of low blood lipids (5).

It is of particular interest, therefore, to examine the serum cholesterol levels of the American Indians in this survey and to compare these with levels of an American white population having a high mean serum cholesterol level (2). The American Indians who were examined resided on the following reservations: Acoma, N. Mex.; Crow, Mont.; Lac Courte Oreilles, Wis.; San Carlos, Ariz.; and Yankton, S. Dak. The relationship with age was also examined and is presented as additional statistical evidence concerning the level of serum cholesterol of populations (6).

Population Studied

The Indian Health Survey was initiated at the request of the 84th Congress, 1st session. The purpose was to determine "the needs and measures necessary to bring Indian health to

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an acceptable level." An interview was conducted with members of every household living on each of nine selected Indian reservations; usually only the adults present were interviewed. This aspect of the survey yielded estimates of the extent of illness and the extent of medical care and health facilities available. The results of these interviews are reported elsewhere (7).

Clinical examinations were conducted in selected households. The examination consisted of medical history, physical examination, and laboratory tests. The purpose was to obtain more specific information on the extent of illness and disease among Indians than was obtained by the household interview. A random sample of members of households on five of the original nine survey reservations was taken for this purpose. Household serial numbers assigned at the time of the initial house-to-house survey were used to select examinees.

Methods

Total serum cholesterol was determined by the method of Abell and associates (8). Blood samples of adult Indians were collected and shipped to the National Heart Institute Laboratory at Framingham, Mass., for determination of serum cholesterol values. The Cleveland Clinic Foundation employed a similar method in obtaining total serum cholesterol values of

the white population group used for comparison. Both the laboratories, Framingham and Cleveland, had previously established the reproducibility of their total serum cholesterol measurements (9).

State of Health

Levels were determined for clinically healthy Indians as well as for those who were found to have diseases or conditions that influence the serum cholesterol level. To conform with the practice of other reporting investigators, however, only those Indians are included here whose state of health was uncomplicated by conditions which might affect serum cholesterol. Women whose clinical records showed that they were pregnant were excluded.

Results

Table 1 summarizes the values of total serum cholesterol of clinically healthy Indian men and women residing on five Indian reservations. For men, the mean serum cholesterol levels range from a low of 193 mg. per 100 cc. for San Carlos Indians to a high of 224 mg. per 100 cc. for Crow Indians. For all reservations, Indian women show consistently lower mean serum cholesterol levels than Indian men. Women residing on the San Carlos Indian Reservation show the lowest mean serum cholesterol value,

Table 1. Serum cholesterol levels in American Indians on five reservations, by sex

Sex and reservation	Number of persons	Serum cholesterol (mg. per 100 cc.)			Age	
		Mean	Standard deviation	Range	Mean	Standard deviation
<i>Male</i>						
Crow.....	28	223.8	41.4	106-310	35.5	9.3
Yankton.....	21	209.9	38.0	154-296	35.9	10.6
Acoma.....	25	223.0	60.3	98-336	38.7	11.0
San Carlos.....	21	193.5	28.5	143-255	36.4	13.0
Lac Courte Oreilles.....	16	212.6	49.1	125-301	38.4	9.0
<i>Female</i>						
Crow.....	26	200.2	45.3	137-345	34.8	9.3
Yankton.....	15	209.1	56.5	137-335	31.0	9.5
Acoma.....	40	191.7	36.0	154-262	34.8	12.3
San Carlos.....	34	189.4	41.4	114-287	32.1	8.6
Lac Courte Oreilles.....	32	199.9	45.1	92-273	38.1	9.6

189 mg. per 100 cc. Women residing on the Yankton Reservation show the highest mean serum cholesterol value, 209 mg. per 100 cc.

Data were combined for each sex without regard to reservation because of the small numbers of serum cholesterol determinations done at each location. Pooling of data seemed justified because there were no significant differences in mean cholesterol among Indians on different reservations. [Males: $F > 1.71$ ($F_{.05} < 2.46$). Females: $F > 0.77$ ($F_{.05} < 2.44$).] Although this sample is homogeneous in regard to serum cholesterol, it is recognized that certain genetic and cultural differences exist between the different tribes. Mean cholesterol levels of Indians were compared with those obtained from the Cleveland Clinic Foundation which had been used for comparison with the level of serum cholesterol of a group of Navajos. The mean levels of the Cleveland group have been found to be in the same range as the levels for other population groups (9). Since the original clinic data were divided into two age groups (2), the American Indian serum cholesterol data were similarly divided, with the age means and standard deviations comparable for both groups.

Indian men and women show a significantly lower mean serum cholesterol than Cleveland men and women for the two age groups (table 2).

Table 3. Serum cholesterol level of selected American Indian males, by age

Age group, in years	Number of males	Serum cholesterol (mg. per 100 cc.)	
		Mean	Standard deviation
20-29-----	31	193.5	29.3
30-39-----	33	227.4	47.2
40-49-----	28	217.8	51.7
50-59-----	19	216.4	45.8

Further evidence of the level of serum cholesterol of a population involves knowledge of the relationship between age and cholesterol. Ample evidence exists that serum cholesterol levels are, in part, dependent on age. Populations with high serum cholesterol generally show a significant rise in serum cholesterol after the thirties, while populations with low serum cholesterol do not show such a rise during this period (6). On the other hand, there are significant increases in serum cholesterol with age in the younger age group to about the thirties in both low and high serum cholesterol populations.

In the low serum cholesterol populations, the mean serum cholesterol reached a plateau after the thirties in the Naples, Italy, area (6).

Table 2. Serum cholesterol levels by age of selected American Indians and a Cleveland white group

Sex and age group	American Indians					Cleveland white group ¹					Comparison (P)
	Number of persons	Serum cholesterol (mg. per 100 cc.)		Age		Number of persons	Serum cholesterol (mg. per 100 cc.)		Age		
		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
<i>Male</i>											
Young-----	64	211	42.8	29	6.1	58	230	33.5	27	8.4	² < .05
Older-----	47	217	49.5	47	5.5	99	242	29.9	45	9.0	² < .05
<i>Female</i>											
Young-----	105	192	42.9	29	6.0	42	216	58.4	26	7.8	² < .05
Older-----	42	206	42.5	47	4.7	55	230	44.5	43	7.5	< .05

¹ Reference 2.

² Cochran and Cox approximate method used to test the hypothesis of equality of means with no hypothesis about the population variance: when $n_1 \neq n_2$ and $s_1 \neq s_2$. Snedecor, G. W., Statistical Methods, Ed. 4, Ames, Iowa, Iowa State College Press, 1946, p. 83.

S.D.—Standard deviation.

Table 4. Statistical tests of the presence of significant age-cholesterol relationship and of departure from linearity of selected American Indian males

Age group, in years	F test	
	Linear trend	Departure from linearity
20-39-----	10.49	0.73
40-59-----	.05	1.50

¹ Significant at 1 percent level.

From the early thirties to the fifties, the level of serum cholesterol in low-income working men of Madrid, Spain (10), tended to decline instead of rising so that the cholesterol levels at these ages were much lower than those of high serum cholesterol level populations.

In high serum cholesterol populations, such as middle-income men in Minnesota (11), professional men in Madrid (10), and Jewish and Italian workers in New York (12), serum cholesterol levels show a rise into the fifties. It should be noted, however, that the study of the age-cholesterol relationship in a high serum cholesterol population in New York did not determine significant age-cholesterol relationship beyond the thirties (13).

Table 3 shows the mean serum cholesterol level of Indian men by age. The mean serum cholesterol rises from ages 20 through 39 years, levels off, and remains fairly constant in the older ages. In order to test the significance of the age-cholesterol relationship, analysis of variance and regression analysis were made.

This age-cholesterol relationship analysis was made for age groups in which *F* tests indicated no significance of deviation from linearity. For Indian men, *F* tests of linearity of age-cholesterol relationship indicated two age groups, 20-39 years and 40-59 years. *F* tests also show that for Indian men there is a significant age-cholesterol relationship in the younger age group, 20-39 years. Significant age-cholesterol relationship is not evident in the older age group, 40-59 years. Statistical tests of the presence of significant age-cholesterol relationship and of the departure from linearity are presented in table 4.

Regression equations for two age groups showing the relationship between age and cholesterol are presented in table 5. For the younger age group there is a significant increase in total cholesterol level, averaging about 3 mg. per 100 cc. per year. In the older age group the average increase is less than one-half mg. per 100 cc. per year, which is not a significant increase.

Table 5 also shows that the predicted mean serum cholesterol value determined from the regression equation for males of ages 20-39 years with an average age of 29.2 years is 211 mg. per 100 cc. The corresponding predicted mean serum cholesterol value for males of age 40-59 years, with an average of 47.3 years, is 217 mg. per 100 cc.

Significant age-cholesterol relationship displayed in the younger age group of the American Indian series is similar to the serum cholesterol level pattern of change with age found in the younger age group of both low and high serum cholesterol populations. The fact that

Table 5. Age and serum cholesterol level relationship of selected American Indian males

Age group, in years	Number	Age		Serum cholesterol (mg. per 100 cc.)				Standard error of slope
		Mean	Standard deviation	Mean	Standard deviation	a ¹	b ¹	
20-39-----	64	29.2	6.1	210.9	39.9	133.2	+2.66	² 0.82
40-59-----	47	47.3	5.5	217.1	50.0	203.4	+ .29	³ 1.33

¹ The values for *a* and *b* are constants with regression equation: cholesterol = *a* + *b* (age). The average annual change of serum cholesterol concentration in mg. per 100 cc. is indicated by the regression coefficient *b* in the regression equation. *X* is equal to age in years; *y* is equal to serum cholesterol level.

² Slope significantly different from zero slope.

³ Slope is not significantly different from zero slope.

serum cholesterol does not continue to rise after age 39 years in the Indian group places this group in the same category as other low serum cholesterol populations which have been mentioned.

Discussion

This study attempted to determine whether level of serum cholesterol of clinically healthy Indians residing on five reservations in the United States is low or high in comparison with the levels usually accepted for general U.S. populations.

It was found that the level of serum cholesterol of this American Indian series was significantly lower than that of a sample group from the Cleveland clinic. This supports the findings of an earlier study, in which it was found that the level of serum cholesterol of a sample of hospitalized Navajos was significantly

lower than that of the Cleveland clinic group (2).

Data from this American Indian series are not available regarding the first and third variables of the interrelationship of fat content of diet to serum cholesterol level to atherosclerosis (and coronary heart disease). When three variables were examined in an earlier study, it was observed that because estimated Navajo dietary fat was not much less than that of the general American level, genetic rather than dietary factors might be largely responsible for low serum cholesterol and low coronary heart disease frequency (2).

Certain suggestive data are available regarding one genetic characteristic of this American Indian series. These data pertain to the quantum of Indian blood for each reservation and were obtained from interviews conducted during the health survey. There is some reason for overstatement of Indian ancestry because

Relation between quantum of Indian blood and mean serum cholesterol.

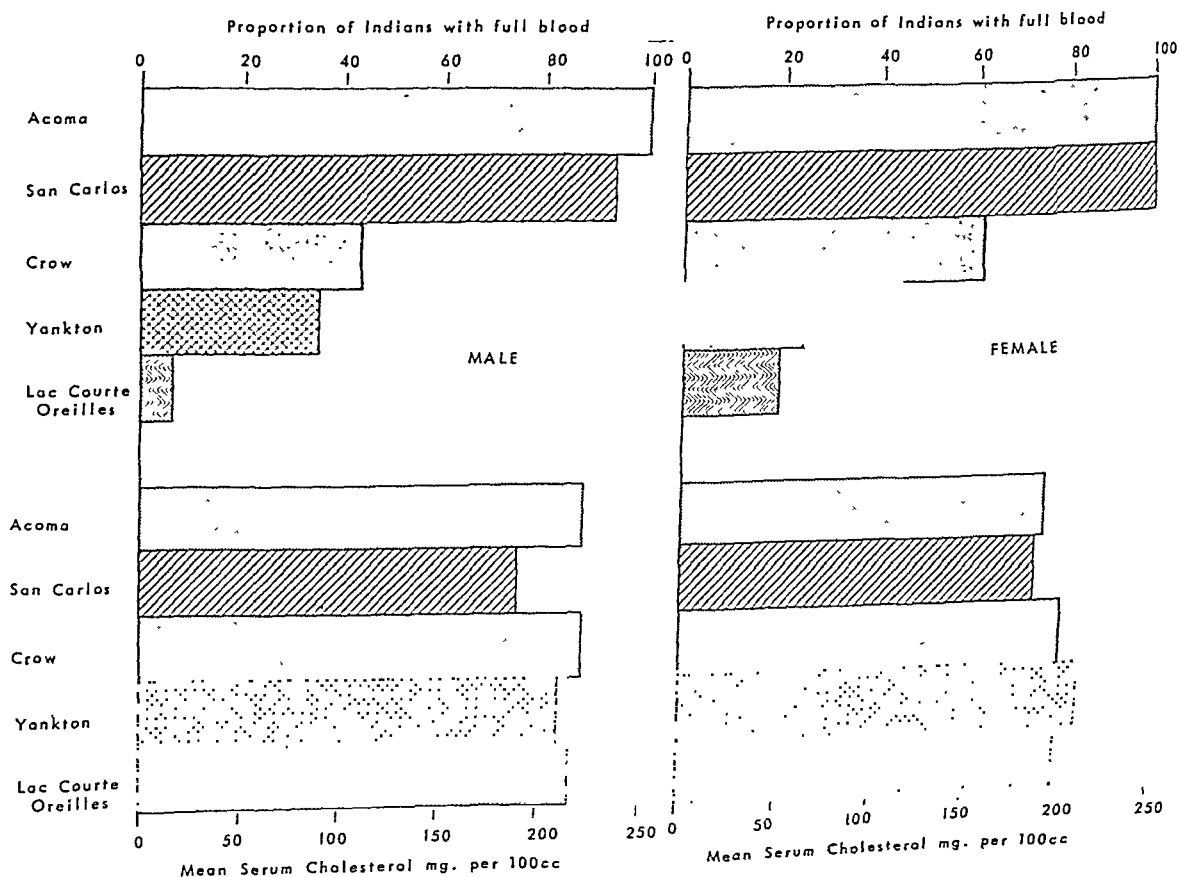


Table 6. Comparison of mean serum cholesterol levels between two blood groups of American Indians on five reservations

Sex	Full blood					Less than full blood					Com- pari- son (P)
	Number of persons	Serum cholesterol (mg. per 100 cc.)		Age		Number of persons	Serum cholesterol (mg. per 100 cc.)		Age		
		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
Male.....	64	216.5	45.8	37.4	10.4	45	209.8	37.7	35.8	9.7	1 > .05 1 > .05
Female.....	100	191.5	36.3	33.7	9.2	45	202.5	48.7	36.9	8.6	

¹ See footnote 2, table 2.

S.D.—standard deviation.

receipt of many benefits depends on having a minimum of one-fourth Indian blood (7). Enumerators in the survey were recruited from reservations, which may have tended to minimize overstatement of quantum of Indian blood.

If the genetic factor as measured by this subjective self-reporting of ancestry is operating to lower serum cholesterol in the Indian population, the reservations with larger proportions of full-blooded Indians should tend to have lower serum cholesterol levels. The chart shows that while there is great variation in proportion of Indians with full blood among the five reservations, there is no relationship between proportion of Indians with full blood and the mean serum cholesterol levels.

Another approach to analyzing the relationship of the quantum of Indian blood and serum cholesterol level was made by dividing the men and women into two groups, those with full blood and those with less than full blood. As indicated in table 6, these two groups, both men and women, have comparable mean ages and standard deviations. This approach confirms the previous analysis by indicating that there is no significant difference in mean serum cholesterol level between the two groups for each sex. It is apparent, however, that more objective measures of genetic characteristics would be necessary before any definite conclusions could be drawn regarding the relationship of genetic factors and serum cholesterol level.

As indicated previously, Darby and associates (5) studied two groups of Navajo In-

dians. One was centered about Ganado, a missionary center. This group consumed fat-rich foods much more frequently and had a mean serum cholesterol level which was significantly higher than the other group of Navajos studied at Pinon, an area located in the interior of the Navajo reservation. It would appear, therefore, that within an ethnically similar group there are considerable internal differences in diet and serum cholesterol patterns.

It must be recognized that various subgroups of Navajos may be ethnically dissimilar. Whether such blood lipid variations are, in turn, associated with differences in morbidity and mortality from coronary heart disease (as might be expected in view of the implication of hyperlipemia in the current popular working hypothesis of causation of coronary heart disease) suggests a fruitful area for epidemiological study of the Navajos, by far the largest American tribe of Indians and possibly the most primitive. Additional impetus to further study of the Navajos stems from another study which indicates that their death rate for cardiovascular diseases is significantly lower than that of all other American Indian tribes (14).

Summary

1. Total serum cholesterol determinations were obtained from five tribes of American Indians who were examined during the Indian Health Survey.

2. No statistically significant difference in their mean serum cholesterol levels was found among the different tribes, but the samples were

too small to conclude that clinically significant differences do not exist.

3. The serum cholesterol level of this American Indian series was significantly lower than that of the Cleveland clinic group, whose mean level is similar to that found in other surveys of American non-Indian populations.

4. The finding is in agreement with the results of a study which found that Navajo Indians have a significantly lower serum cholesterol level than that of a similar American clinic population.

5. The finding, in another study, of a higher serum cholesterol level among one subgroup of the Navajos and of a significantly lower mean level among another subgroup suggests important environmental factors at work among this ethnic group. The circumstance lends itself favorably to further epidemiological study of dietary patterns, blood lipid levels, and occurrence of coronary heart disease among the Navajos.

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Shellfish Sanitation Laboratory Moves

The Shellfish Sanitation Laboratory, Robert A. Taft Sanitary Engineering Center, has moved from Gulf Breeze, Fla., to Purdy, Wash. The new mailing address is: U.S. Department of Health, Education, and Welfare, Public Health Service, Shellfish Sanitation Laboratory, Star Route Box 576, Gig Harbor, Wash.

New York City's experience with compulsory hospitalization of a hard core of recalcitrant tuberculosis patients demonstrates varied benefits for the majority of these patients.

Forcible Detention of Patients With Active Tuberculosis

ROBERT GLASS, M.D.

LEGAL REGULATIONS governing forced hospitalization of recalcitrant patients with communicable pulmonary tuberculosis apply in many States of the United States (1). Only a few States attempt enforcement, however, because most lack facilities suitable for isolation of recalcitrant patients. Programs for forcible isolation of recalcitrant patients suffering from active pulmonary tuberculosis are in effect in California, particularly Los Angeles County (2,3); Seattle, Wash. (4); Milwaukee, Wis. (5); Nova Scotia, Canada (6,7); Columbus, Ohio (8); Philadelphia, Pa. (9); and in the State of Georgia (10).

Since 1903, New York City has had regulations governing and directing forced hospitalization of recalcitrant patients suffering from communicable diseases, including tuberculosis. From 1916 to 1942, the city used for this purpose a municipal hospital on an island in the East River, accessible only by ferry boat. A guard at the hospital gate sufficed to prevent illegal departures from the hospital, which could hold 60 to 100 patients at one time. After 1942, this hospital was diverted to other uses, and the detention of these patients was tried in two other municipal hospitals in succession.

Dr. Glass is a clinician with the bureau of tuberculosis of the New York City Department of Health. The program referred to in this paper is carried out with the cooperation and assistance of the New York City Department of Correction.

The physical nature of these facilities, however, and the lack of correctional personnel were inadequate to prevent escapes.

In 1955, limited facilities for the detention of recalcitrant male patients suffering from communicable pulmonary tuberculosis were provided at the hospital of the Rikers Island Penitentiary for men, where the medical and administrative arrangements appeared to offer good prospects.

This report presents the results of the enforced hospitalization of 46 male patients successively admitted to Rikers Island Hospital in New York City from July 1, 1955, through December 31, 1957.

The New York City Program

Patients are admitted to the detention service as violators of the Sanitary Code of the City of New York, section 87, regulation 16; and section 97, regulations 3, 4, 5, and 6. These paragraphs empower the commissioner of health of New York City to remove to and detain in a hospital, patients suffering from pulmonary tuberculosis in a communicable form, who present, or are likely to present, a danger to the lives and health of other persons. These patients are known to the department of health as persons who have pulmonary tuberculosis with positive sputum or cavitary lesion and who willfully neglect to take precautions against transmission of the disease. Nonattend-

ance at chest clinics, refusal to accept hospitalization, and irregular discharges from hospitals are frequent features in the records of these patients. Chronic alcoholism is also present in a comparatively high percentage of this group.

Forcible hospitalization on the detention service is undertaken only after physicians, nurses, and medical social workers, through concerted action, have exhausted by personal contact and by mail all possible means of soliciting the recalcitrant patient's voluntary cooperation (11).

As a premonitory measure, the "hold" procedure has been instituted. Patients who in the past have habitually left the hospital against advice, have not returned from permitted leave, or have disregarded hospital regulations are given the alternative of accepting voluntary hospitalization with strict adherence to hospital regulations, or removal to the detention service under the regulations of the sanitary code. Under the "hold" procedure the patient, as well as the administration of the hospital to which he is admitted, is informed that the patient is not to be given a pass without consent of the department of health or be allowed to leave the hospital against medical advice. If the patient fails to observe the provisions of the "hold," the hospital administration reports the facts to the department of health. The patient is then removed from the hospital to the detention service by due process of law. A "hold" is placed only on those patients who, if not hospitalized, would be subject to forcible hospitalization.

Management

Patients in the detention service receive combined chemotherapy and supportive drug treatment for tuberculosis and whatever medication may be indicated for nontuberculous conditions. Transfer, under "hold," to nondetention hospitals is arranged for patients whose condition, tuberculous or other, requires methods of treatment, especially surgical, or methods of examination for which the Rikers Island Hospital is not equipped.

Sputum concentrates and cultures and drug sensitivity tests are done at the bureau of laboratories of the New York City Department of Health. All other tests and X-ray examina-

tions are performed at the Rikers Island Hospital.

Treatment of the patients is directed and supervised by a consultant on the staff of the bureau of tuberculosis of the health department, who serves as a liaison officer between the department of health and the department of correction. The consultant visits the Rikers Island Hospital every week, submitting his reports and recommendations to the director of the bureau of tuberculosis.

Decisions on transfer or release of detained patients are based on these reports and recommendations.

The medical social workers at Rikers Island and the department of health assist the patients and their families during the time of hospitalization and prepare the ground for care and assistance after discharge.

Release From Detention

Release from detention service is granted to patients whose tuberculosis becomes clinically arrested, and whose treatment and medical supervision can be safely continued outside the hospital.

Also, patients are released who, after a period of observation on the detention service, seem to have acquired satisfactory understanding of their condition and of the need for their continued hospitalization and treatment. Such patients are transferred to nondetention hospitals for the continuation of their isolation. To insure a greater degree of control, a "hold" is placed on them.

Between July 1, 1955, and January 1, 1958, 46 men were admitted to the detention service. They included one readmission case. Fourteen had moderately advanced pulmonary tuberculosis and 32, far-advanced disease. None had minimal disease. Ages ranged from 21 to 72 years with an average of 44 years. The following is the age distribution:

Age group	Number of patients
21-29	10
30-39	15
40-49	8
50-59	10
60-72	3

The majority showed features of antisocial behavior: 16 were alcoholics; 1 was a drug ad-

North Carolina Regulations

Legal regulations applying to the forced hospitalization of recalcitrant patients with communicable pulmonary tuberculosis have been enforced in the State of North Carolina for a number of years. The following appears in section 1, article 19A, chapter 130 of the General Statutes in the Cumulative Supplement of 1949, which was rewritten and ratified by the North Carolina General Assembly on March 29, 1951.

"The infectious patient that willfully fails and refuses to accept treatment as determined by the local health officer shall be guilty of a misdemeanor and shall be imprisoned in the prison department of the North Carolina Sanatorium. The period of imprisonment shall be for a period of 2 years. The medical superintendent may upon signing and placing among the permanent records of the North Carolina Sanatorium a statement to the effect that such person may be discharged without danger to the health or life of others at any time during the period of commitment. At time of discharge he will give a full statement of his reasons to the health officer serving the territory from which the person came. He also has the authority to transfer the patient from the prison division to the main sanatorium or if a veteran to a Veterans Administration hospital if the patient has demonstrated his willingness to obey the rules and regulations of the sanatorium and State laws."

dict; and 6 had records of previous violation of the criminal law. Two had to be removed to psychiatric institutions. The known duration of their disease prior to confinement varied from 3 months to 10 years, with an average of 44.7 months. The duration was less than a year for 7 patients and from 13 to 24 months for 8 patients. Twenty patients had had the disease from 25 to 60 months and 11 patients longer than that.

Each of the 46 patients had had multiple hospitalizations, the maximum being 44, and multiple irregular discharges from hospitals, with a maximum of 28. The average was 7 for hospitalizations and 5 for irregular discharges from hospitals. One patient after his first and only visit to the chest clinic, where his disease

Confined patients receive combined chemotherapy, supportive hospital treatment, and surgery, as indicated.

The law has several effects on potential irregular discharges:

- Patients know that the local health officer has the power to enforce hospitalization and treatment through court procedures. Patients transferred to the Veterans Administration Hospital at Oteen, N.C., from the prison section have continued their treatment without further trouble and have not attempted to leave against medical advice.

- Patients soon acquire an insight into their condition when they begin to improve as a result of enforced treatment. They soon develop the desire to acquire an inactive diagnosis so that they can be released and returned to their homes. Consequently they adhere to hospital rules and accept treatment.

- When a patient leaves the Veterans Administration hospital irregularly, his local health officer is notified within 24 hours. If he is receiving chemotherapy, a recommendation is also made as to drugs and duration of treatment.

- Chronic alcoholism is a large factor in failure to accept hospitalization and treatment. Enforced hospitalization provides the opportunity to help the patient with this problem.—R. E. MOYER, M.D., *chief of the tuberculosis service, Veterans Administration Hospital, Oteen, N.C.*

was diagnosed by chest X-ray and sputum examination, refused further attendance at the clinic or hospitalization.

The time elapsed since the last attendance at a chest clinic or last hospitalization varied from 2 days to 2 years, with an average of 3½ months. Twenty-two patients were brought to detention as violators of a "hold." Of the remaining 24, one-third had been out of clinics or hospitals, without medical supervision, for a period of more than 6 months.

Followup

As of December 31, 1957, the patients had spent from 70 to 447 days on the detention service prior to their release or transfer, with an average of 180 days, not considering those pa-

tients who, on December 31, 1957, were still confined to detention. One patient had to be transferred to a psychiatric institution 2 days after his admission to the detention service. He had not been diagnosed as a psychiatric case at any time previously.

Of the 15 patients discharged with arrested disease from detention hospitals up to the end of 1957, 8 originally had had moderately advanced disease and 7 far advanced. Among those discharged from nondetention hospitals after medical treatment only, one had had moderately advanced disease and another far advanced; one of the patients discharged after pulmonary resection had had moderately advanced tuberculosis and three far advanced.

Ten of the group discharged from detention with arrested disease are attending chest clinics where they are receiving medication. One patient had to be rehospitalized in a nondetention hospital because of reactivation of the disease; another was hospitalized for a nontuberculous condition, and three were lost from clinic followup and are not accounted for.

On December 31, 1957, 8 patients were still confined to the detention service, 1 patient had died there from a pulmonary hemorrhage.

Twenty-two patients had been transferred to nondetention hospitals. In this group, six men achieved arrested status; two of them had medical treatment only, and four achieved arrested status after they had accepted, and received, pulmonary surgery. After regular discharge from the nondetention hospital, these patients are now attending chest clinics.

Four patients managed to escape from the hospital to which they had been transferred from the detention service in spite of the "hold" which had been placed on them. Two patients died in nondetention hospitals, one of them from a nontuberculous condition. At the end of 1957, 10 patients were still hospitalized in nondetention hospitals, 2 of them in psychiatric institutions.

The sputum of 12 patients had become negative prior to admission to detention. Seven of them had been violators of a "hold" while hospitalized in a nondetention hospital and therefore had to be brought to detention. Their last positive sputum had been reported within a month prior to their commitment to detention.

Five patients had been recalcitrant over periods of 3 to 6 months, and their last positive sputums dated that far back.

Fifteen patients were discharged from detention as arrested cases on the basis of negative sputums and gastric cultures and stationary chest films with absence of cavitation, observed over a period of at least 6 months, and also on the basis of predetention reports and findings. Six patients transferred to nondetention hospitals achieved control of their disease and regular discharges as arrested cases. Four patients had surgery and were observed over a period of at least 3 months postoperatively to have negative cultures and stationary chest films with absence of active disease. Two were medically treated patients who were observed for at least 6 months after sputum conversion and who had stationary chest films showing no cavitation and no disease activity.

By December 31, 1957, four patients were still confined to detention, with sputum converted and chest films showing improvement or approaching stabilization over a period of less than 6 months. At nondetention hospitals the corresponding group comprised three patients. The remaining 18 patients, on detention and in nondetention hospitals, were still considered as active cases, either with sputum tests proving activity or with such reports pending.

Discussion

The reaction of the patient to forced hospitalization varied in accordance with his personality. During the consultant's visits on the detention ward, every effort was made to educate the patients about their condition and its clinical and public health aspects. Their clinical records were explained to them and, as far as possible, X-ray findings and changes outlined.

Such explanations had been offered to these patients whenever possible prior to commitment to detention, but the patients were more inclined to accept these explanations after they recognized the improvement from required treatment. The patients were shown that in many instances the prolonged stay and treatment on the detention service had produced good results, even arrest of the disease. The

impossibility of the patient's signing out at will and adherence to strict hospital rules and regulations served as important adjuvants to the medical treatment.

Prior to their commitment to the detention service, when not submitting to regular treatment, these men had not given themselves an opportunity to experience a favorable development in the course of their disease. For the first time the majority of detained patients were in a position to realize the change in their condition as this was demonstrated and explained. They also learned to understand the need for the protection of the community against infection and for their own care and medical supervision. Some of the patients who formerly had been the most recalcitrant have been attending chest clinics regularly since their release from detention or nondetention hospitals with arrested disease. Others, transferred to nondetention hospitals, have remained there without attempt to leave against medical advice and have shown full cooperation with the hospital staff. However, it is only fair to state that the poorest results were in the group of chronic alcoholics. There were six alcoholics in the group of seven who were lost from further followup after their release from detention with arrested disease or as irregular discharges from nondetention hospitals to which they had been transferred from detention.

The administrations of several nondetention institutions with tuberculosis services requested the transfer to their hospitals of patients in detention who were eligible for such a transfer to demonstrate to their own potential irregular discharges that the department of health can enforce hospitalization of recalcitrant patients who are a menace to public health and who do not accept the regulations of the sanitary code. The fact remains, however, that there exists a small hard core of individuals for whom all efforts to obtain cooperation have no effect, and for this group detention remains the only means of control (12, 13).

Summary

In June 1955, the New York City Department of Health in cooperation with the Department of Correction set aside beds at the Rikers Island

Hospital for enforced hospitalization of recalcitrant male patients with active pulmonary tuberculosis who were a danger to public health.

Forcible detention is undertaken only after exhausting all means of enlisting the voluntary cooperation of the recalcitrant patient.

A total of 46 patients, including one who was readmitted, were put on the detention service from its initiation in July 1955 through December 31, 1957. Of these, 20 became arrested cases of pulmonary tuberculosis, either while confined to the detention service or after transfer to a nondetention hospital. There were four irregular discharges from nondetention hospitals. Three patients, released from detention as arrested cases, did not report to chest clinics for continuation of their medical supervision and treatment. Three patients died, one on detention, from a pulmonary hemorrhage, and two in nondetention hospitals, one of them from a nontuberculous condition. One patient suffered reactivation of tuberculosis after his release from detention as an arrested case and while attending a chest clinic. He was rehospitalized in a nondetention hospital.

By December 31, 1957, 18 patients were still hospitalized on the detention service or in nondetention hospitals. Seven of these men showed improvement, bacteriologically and by chest X-ray, quantitatively and qualitatively, which may permit expectation of control of their condition in the future under continued hospital treatment.

The patient who had to be readmitted to detention and who was subsequently transferred for a second time to a nondetention hospital is still hospitalized there. His condition is slowly improving.

The 46 recalcitrant patients treated in about 18 months represent a small proportion of the number of persons in the area with active pulmonary tuberculosis requiring hospitalization. Stimulated by results during this limited period, preparations are being made for expansion of the forcible detention program.

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Children On Their Own

Nearly 400,000 children under 12 years of age have to care for themselves while their mothers work, the Children's Bureau reports. About 138,000 of these children are under 10 years of age.

A special survey conducted for the Children's Bureau by the Bureau of the Census, which covered the arrangements made by working mothers for care of their children during May 1958, also brought out the following information:

Among children under 12 years of age, 1 in 13 whose mother works must look out for himself for varying periods. In the age group 10-11 years, 1 child in 5 is without any care while the mother works.

The number of mothers in the labor force with children under 18 years of age has more than doubled since 1950. During the period studied, a total of 2,873,000 mothers were working full time. Of their 6,665,000 children, 5,073,000 were under 12 years of age. All the children of nearly 1 out of 4 of the working mothers were under 6 years old.

Most of the children for whom day care was arranged were in charge of either fathers or relatives while their mothers worked. About 1,034,000 were looked after by nonrelatives who either came into the children's homes or cared for them in their own homes. About 24,000 children under age 3 years, and 67,000 children between the ages of 3 and 5, were in group care.

Authorities in the Children's Bureau doubt that children under 3 years should be cared for in groups. Such children ordinarily need individual attention from their mothers or from a mother substitute, they say.

Progressive Patient Care

—a challenge to hospitals and health agencies—

JACK C. HALDEMAN, M.D.

THERE has been a ground swell of interest in public health circles during the last several years in reexamining the entire concept and structure of community health services.

The last two annual meetings of the National Advisory Committee on Local Health Departments of the National Health Council have addressed themselves to such subjects. The American Public Health Association is also studying current patterns of organization of local health departments in relation to the kind of health services most needed today. There has been a rebirth of interest in the research approach to current problems of public health practice—community-oriented research aimed at developing new and better methods of public health services.

Health departments are not alone in recognizing a need to reevaluate their services. Hospitals are also facing this dilemma. On the one hand the medical profession and the American public expect and demand increased and better hospital services; on the other hand much concern is being expressed regarding the ever-rising costs of hospital care. Related to these problems is the need for more trained personnel than are available.

The public has become increasingly aware of the advantages of hospitals and nursing homes for the treatment of illness. Physicians

require the hospital's resources to apply modern techniques of effective diagnosis and therapy. Each year a larger percentage of our population is over 65 years of age, and persons in this age group require twice as much hospital care as younger persons. Some illnesses and injuries, former killers, now are effectively treated, but at the expense of many days in the hospital. Further, we may expect that better methods of financing will increase hospital use by people who do not use them now because of economic barriers.

Hospital Costs

Some of the very factors which increase hospital use also increase costs per hospital day. The advances in scientific medicine increase comfort and save lives, but more people, space, and equipment are required to do the job. In 1946 each hospital admission required an average of 4 laboratory procedures; today the average is 14. Although illness occurs on a 7-day week, hospital employees are gradually achieving the 5-day workweek. The short workweek, inflation, and the need for greater skills, plus competition for scarce personnel, has forced salaries up. An increase since 1946 of general hospital personnel from 1.5 to 2.0 employees per patient, coupled with salary increases, makes higher per diem costs inevitable.

Thus, hospitals are faced with having to provide more hospital days at higher costs per day.

Some comfort can be taken from factors which tend to offset these trends. Some medical discoveries—and hopefully more in the future—eliminate the need for hospitalization for some illnesses. Others have helped shorten the

Dr. Haldeman is an Assistant Surgeon General and chief, Division of Medical and Hospital Facilities, Public Health Service. This paper was presented in basically the same form at the meeting of the Surgeon General with the State Hospital and Medical Facilities Survey and Construction Authorities, March 10, 1958.

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Authorities in the Children's Bureau doubt that children under 3 years should be cared for in groups. Such children ordinarily need individual attention from their mothers or from a mother substitute, they say.

In the long-term care unit are patients requiring prolonged care.

Home care, the fifth element of progressive patient care, extends hospital services into the home to assist the physician in the care of his patients.

By concentrating patients with similar nursing needs into separate units in this manner, the staff can be selected, trained, and adjusted in number to render maximum service. Physical facilities can be planned accordingly.

There are many unanswered questions regarding progressive patient care. Much additional research is needed. For example, we can, at this time, only speculate on its possible effects on hospital costs. Also, there are other administrative devices for improving services which should be tested.

The basic concept of progressive patient care is far broader than its relationship to the general hospital. A similar trend has been developing in the mental health field. There is growing emphasis upon the provision of community facilities and services for patients with mental disorders, in contradistinction to continued enlargement of State institutions for the care of the mentally ill. Again, the objective is to look at the patient in accordance with his particular needs. Here, application of the progressive patient care concept leads to consideration of the need for a psychiatric unit in the general hospital, diagnostic and treatment facilities on an outpatient basis at the community level, including separate clinics, a halfway house involving sheltered care and group therapy, the so-called day hospital or night hospital, sheltered workshops, and home care programs.

In modern treatment of tuberculosis, too, treatment begun in a hospital can now be continued safely and effectively in the home at a relatively early stage.

Clearly, effective patient care, directed to the total needs of the patient requires better community planning than now exists in most places. Certainly public health workers should actively participate in this planning. In many places, the health officer can be the initiator of certain aspects of the program, assuming responsibility for the organization rather than the provision of services. Public

health workers are well equipped to contribute to the long-term care and home care aspects of progressive patient care. By virtue of the multidisciplinary character of the health department staff and the focus of their training, they are accustomed to working as a team. They are also accustomed to teaching the patient and the family how to do for themselves rather than doing for them.

Before this potential contribution can become reality, however, public health people must demonstrate a willingness to supply the necessary skills. They must also fully accept, as a public health responsibility, the role of assisting the physician in the care of his patient through the provision of such services as home care programs. Actually, in places where public health workers are engaged in followup of patients discharged from tuberculosis and mental hospitals, they are already involved in some facets of progressive patient care. Extension of this responsibility to other types of long-term care, especially that associated with chronic illness and other long-term disabilities, should not be too difficult a hurdle to take. And yet, some brave new thinking is required.

It is relatively easy to determine for the community as a whole the magnitude of facilities and services needed for intensive, intermediate, and self-care, since these are measured in terms of hospitalized patients. Within the hospital, there can be a daily evaluation of the number of patients requiring each kind of care. With respect to long-term care, however, the situation is more complex. Here we are concerned with a dual problem: On the one hand are the many patients in general hospitals who could be transferred to a long-term care facility; on the other hand, many disabled persons are scattered throughout the community who would benefit by such care if it were available. The health officer and his staff are in a strategic position to assess the scope of the need for this latter type of care.

The home care segment of the program presents quite a different dilemma. For other elements, the organizational framework within which the service is provided is quite clearly that of the hospital or long-term care facility. For home care, some services are supplied by the hospital and some by other community

hospital stay. Improvement in managerial efficiency is a third factor.

Since it is clear that hospital costs and needs for scarce personnel cannot be reduced by arbitrarily cutting back services, hospital people feel it essential to review hospital operations critically; to isolate areas where increases in efficiency can be instituted without sacrificing quality of care. They feel that an important method of coping with their present dilemma lies in the systematic study of such areas and in the application of the results of research to the development of:

- More effective organizational patterns for the provision of medical services to the people.
- Better community planning for hospital facilities and better coordination of facilities within a community.
- Better techniques of administration.
- Improvement in the design of the physical plant.

This at the very same time that public health workers are asking how the health department can reorient its programs to meet more adequately the major health problems of today.

Hospital and public health personnel are both dedicated to the same goals. In the past, however, they have directed their primary efforts to opposite ends of the spectrum of the need for services. The hospital administrator has concerned himself largely with service to the acutely ill patient; the public health official has devoted his efforts principally to preventing disease; and the voluntary health agency has concentrated on gaps in health services. But there is beginning to appear unmistakable evidence of the willingness of these three groups to work together in planning complete community health programs.

Increasingly in the future, I believe, official and voluntary health agencies will sit down jointly with hospital planners to assess the need for community health facilities and services.

New Patient Care Concept

From the hospital side, there is already evolving a new concept of organization of services which shows promise, the concept of progressive patient care. This development has arisen from the attempt to better administra-

tive devices for providing the health services most needed by the people.

Many hospitals are now incorporating one or more of the progressive patient care elements in their procedures. It, therefore, behooves both hospital and public health worker to examine this concept and identify their own possible roles.

The central theme of the progressive patient care concept is the organization of facilities services, and staff around the medical and nursing needs of the patient. Its objective is that of tailoring services to the needs of the individual patient, whether in the hospital or the home. Patients are grouped according to their illness and their need for care. The staff serving each group of patients is selected and trained to provide the kind of services needed by that group.

The progressive patient care concept envisions the general hospital of the future as the focus of both outpatient and inpatient care; as much concerned with care of the long-term patient as with the treatment of the short-term patient; as readily available for assisting the physician with care of his patient in the home as for assisting him with care of the patient in the hospital.

Five elements are usually associated with the concept of progressive patient care in the general hospital: intensive care, intermediate care, self-care, long-term care, and the extension of hospital services through organized home care programs.

In the intensive care unit, critically ill patients are concentrated in one area regardless of diagnosis. These patients are under constant audiovisual observation of the nurse, with life-saving techniques and equipment immediately available, and with nursing staff selected and trained to care for this type of patient.

In the intermediate care unit are concentrated patients requiring a moderate amount of nursing care, not of an emergency nature, many of whom are ambulatory for short periods and who are beginning to participate in the planning of their own care.

The self-care unit gathers patients who are physically self-sufficient and require only diagnostic or convalescent care which can be provided in hotel-type accommodations.

National Conference

on AIR POLLUTION

Air pollution is an undesirable and in many cases unnecessary byproduct of human activity. Its annual cost to the Nation, estimated at between \$1.5 and \$4 billion, does not include impairments to health, which cannot yet be accurately appraised, or the psychological damages associated with living and working in a befouled atmosphere.

The first National Conference on Air Pollution, was held November 18-20, 1958, in Washington, D.C., to assess the effects of air pollution and progress toward abatement. Summaries of 15 of the technical papers presented at the conference follow. These have been selected by the editors of *Public Health Reports* with the interests of our readers in mind. Many of the others have been distributed in quantity. Complete proceedings of the conference are for sale (\$1.75) by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Effects on Health

brief Knowledge of what air pollution does to human beings is steadily progressing.

It is clear from experiences in the Meuse Valley of Belgium in 1930, in Donora, Pa., in 1948, and in London in 1948, 1952, and 1956 that under certain meteorological conditions pollutants in the air may build up to lethal concentrations. In spite of the fact that the deaths in these acute episodes are linked to air

pollution, the mechanism by which the deaths occur is far less clearly understood. The concentration of specific pollutants in these acute episodes did not approach levels considered dangerous for working conditions in industrial plants.

Exposure to certain types of air pollutants over long periods of time can cause chronic bronchitis. This clinical entity is well recognized in Great Britain. But the exact mechanism of causation is not understood.

Other inferential evidence links air pollution with illness. Death rates for arteriosclerotic and other heart conditions and cancer of the stomach, esophagus, and lungs are higher in urban than in nonurban communities. Air

Based on a paper by James P. Dixon, M.D., commissioner, Philadelphia Department of Public Health.

agencies. This is the stage of the full sequence of care in which the health department might be expected to have a major role. A wide range of services is desirable if maximum assistance is to be given the physician in the care of his patients. Physical therapy, occupational therapy, home nursing care, social services, X-ray, laboratory services, nutritional aid, and home-maker services, to name a few. The health department has an important role in giving guidance and leadership in developing resources to provide the services needed. Some of these can be supplied by the health department. Some can more appropriately be obtained from other sources. Not always will the same agency be the provider of service. The health department must be willing to fill in the void and equally willing to promote the use of and to lend its support to services already available under other auspices.

Hospital-based services are, perhaps, more apt to give continuity of care than those based elsewhere. It is easier for one organization to assist the physician in management of the patient's full regimen of treatment, even when some of the services used are provided from other sources. A home care program must be medically supervised, and adequate medical records must be maintained. Although an underpinning of financial support for the program will be needed if services to the medically indigent are to be provided, provision should be made for patients to pay for services whenever possible. The business office of a hospital can incorporate such payment in its regular system of patient billing without difficulty.

In some communities, particularly those with several hospitals, more complete coverage may be obtained through a home care program with services emanating primarily from the health department. A great deal more study and research is needed in this area to establish principles for the most effective organization of home care programs.

Nursing service may be provided equally well from the hospital, the health department, or the visiting nurse association. In weighing the ability and responsibility to provide this, or any other part of the total services needed, hospital and public health workers will have to think in terms of services the people need, the

services they want, and the methods by which they can be furnished.

Joining Forces

Misunderstandings concerning who is responsible for what may be avoided by formal documentation of the relationship of various services. Likewise, the methodology of getting patients transferred from one service to another must be carefully worked out and understood by all participating agencies. A few communities have made a good start in this direction.

It is not uncommon for a health department to use hospital outpatient facilities for its heart, tuberculosis, or prenatal clinics. On the other hand, except for obstetrics and occasionally pediatrics, many public health workers still do not instinctively think of cooperative enterprises in which the health department and hospital jointly participate. As a local health officer some years ago, I certainly did not.

During the past few years, State health departments have been drawn closer to hospital and nursing home operations and their problems through their licensing and inspectional programs. As a rule, however, and perhaps of necessity, this has been a highly centralized function of a relatively small staff in the State health agency. The rank and file of public health workers have not participated to any considerable extent.

Health leaders are engaged in a never-ending search for ways and means to provide the kind of services the people need in ways that are most acceptable to them. In these days, when the chronic diseases and other long-term disabilities are the dominant clinical burden, neither the hospital nor the health department can escape its share of responsibility for providing the services such illnesses require.

By joining forces in a well-organized program of providing services tailored to meet patient needs, progressive patient care in its broadest concept, the resources of both the health department and the hospital can be used to far greater advantage to serve the total health needs of the community. At the same time, a vast new area of interest and of service will be opened to hospital and public health workers alike.

make respiration more difficult and increase demands on the heart. It is through such mechanisms that the irritant gases in gas warfare or in intense accidental exposure cause severe symptoms or death. The movement of fluid into the airspaces often requires time to develop into a serious threat, and the full effects may be delayed hours or several days.

Since the scrubbing action of the upper airways may prevent highly soluble gases from reaching the deep lung, it is the irritant gases of moderate and low solubility that are of particular importance in producing irritation of the deep lungs. However, there is some evidence that the simultaneous presence of particles may aid in the transport of the more soluble gases into the deep lungs.

The effects of the irritant materials already discussed do not necessarily represent permanent irreparable damage. Function has been interfered with but structure has not been irreversibly altered. Accordingly, recovery might be complete after a single nonfatal exposure, and, with low levels of exposure, the irritant consequences might not even be observable. But it is not unreasonable to infer that a person who has pulmonary edema or a heart already strained to the maximum would be able to tolerate lesser interference with the respiratory system than healthy persons. These are some of the grounds for concern about the effect of moderate concentrations of irritants on persons already under a disease stress. These functional effects have been readily apparent with the intense exposures occurring in several air pollution disasters.

These functional effects are much less evident, and possibly insignificant or absent, with the level of irritants present in the majority of cities of the United States. If health impairment of this sort is contributed to by moderate levels of contaminants, their identification and measurement may be difficult because of their threshold nature and because similar symptoms are found in individuals with disease whether the air is polluted or not.

The phenomena already mentioned deal with dynamic changes in the functioning of the lungs, not structural damage. But there is some basis for concern that continued irritation may lead to definite organic damage to the

lung tissues. This has been the implication of British studies which associate high bronchitis rates with high levels of pollution. Also, work done in Dr. H. E. Stokinger's laboratory suggests that continued exposure to low levels of ozone may produce fibrotic changes in the lungs of experimental animals. Other possible but uncertain consequences of the prolonged action of irritants might include emphysema, lowering of resistance to infection, and, through interference with the lung's excretory mechanism or otherwise, increased susceptibility to lung cancer from inhaled carcinogens.

The irritants may be in the form of gas, tiny particulates, or smog particles of oxidized hydrocarbons. The larger particulates tend to be screened out in the upper respiratory system, while the smaller are more likely to penetrate the deep lungs. The suspended particulates that typically are found widely distributed are generally in the smaller sizes which readily enter the pulmonary systems. These particulates may be irritants themselves or may intensify the action of an irritant gas.

Synergism

Of concern for some time has been the possibility that the presence of particulates might synergistically potentiate the irritant action of gases. Two major possibilities are that if irritant gases are dissolved in or absorbed on particulates, they may be carried past the normal protective mechanism of the upper respiratory passage and reach more vital parts of the lung, and that a more intense local dose may result at the point of contact than would occur by normal gas absorption, due to a high local concentration of adsorbed gas around the particle.

Experimental verification of potentiation in animal studies appears to have been accomplished by the work of Dr. Charles Labelle and Dr. Mary Amdur. Goetz has suggested that this potentiation may be of general importance and has outlined some of the characteristic interrelationships of gases and particulates which would determine whether synergism would occur or not.

We are dealing with dose-related phenomena, that is, the greater the dose or insult, the more intense the response. Over past years a widely

pollution is more intense in urban areas, but we cannot say, at present, that a cause and effect relationship has been established.

Throughout the industrialized world, lung cancer is showing a striking increase as a cause of death. Cigarette smoking has been implicated as an associated factor. However, even after correcting mortality rates for lung cancer for the effects of smoking habits, the incidence of lung cancer is still significantly higher in urban than in rural areas.

Observations indicate that a number of the pollutants in the air of some communities can produce cancer in experimental animals. This information, which does not verify that air pollution is a cause of cancer, seems to demand that the relationship between the two be explored thoroughly.

In the past, public health personnel have frequently had to operate upon generalizations and to develop control measures before the specific etiology of the disease was known. Present knowledge is sufficient to warrant a fundamental concern about the effects of polluted air upon health.

The available data demand a reasonable effort to reduce the quantity of pollution in the air and vigorous research on the specific effects of air pollution on health. Expanding industrialization in the United States and in other parts of the world make such efforts and research urgent, lest gas masks become as common as shoes.

Effects of Irritants

brief

Still uncertain is the relationship to general health impairment of the moderate concentrations of irritants found in the air of our larger cities.

Ready reactivity with tissues seems to be the only factor common to the materials classified as irritants. The biochemical reactions involved in the irritant effect differ. They may be direct and essentially corrosive in nature, as is sulfuric acid. Aldehydes presumably react

with cellular proteins. Ozone is a strong oxidant. Other irritants interfere primarily with some of the intracellular enzyme systems.

In each case, there is a direct and damaging local chemical action on the cell. In most instances this action is immediate or rapid. However, changes secondary to the direct effect can require hours or months for full development.

As defined in this paper, the category of irritants includes sulfur dioxide, sulfuric acid, acid sulfates, ozone, the nitro-olefins, recently identified and shown to be strong eye and pulmonary irritants, and a number of organic free radicals, aldehydes, and higher oxidation products of hydrocarbons.

Both the nature and the extent of the biological response are modified by the relationship between the physical and chemical properties of the irritants and the structure and responsivity of the lung. When a sufficient concentration of irritants contacts the upper airways, coughing and respiratory distress shortly result. Other effects on the lining tissues of the bronchi are interference with the action of the cilia, the lung cleansing system, or change in the rate of secretion of mucus. Damage to the cilia and change in their rate of motion have been shown to result from exposure to sulfur dioxide and synthetic smog. Gases of high solubility may not penetrate beyond the conducting airways and so the effects of the kind just described are all that might be seen.

Effects on the Alveoli

However, when irritants enter the alveoli, the consequences are different. Here the primary, immediate effects appear to be on cell permeability, or what may be called the "leakage rate." Generally, the effect leads to the passage of fluid into the alveolar spaces from the bloodstream. Also, there may be a change in the caliber of the capillary blood vessels in contact with the alveoli. The fluid increases the distance through which oxygen and carbon dioxide must diffuse, impairing their exchange, and reduces the space available for gas in the lungs. In extreme instances, whole sections of the lung may be unusable because they are literally drowned in fluid.

Thus these irritant gases in the deep lungs

Based on a paper by Norton Nelson, M.D., director, New York University Institute of Industrial Medicine, New York City.

method for measuring the effect of gases on the airway resistance of guinea pigs. She found that the presence of minute droplets of common salt solution in the air greatly increases the guinea pig's sensitivity to sulfur dioxide. In salt mist the concentration of sulfur dioxide at which the animals' airway resistance increases is very near that which occurs during episodes in which sulfur dioxide is a major pollutant.

Experimental studies of the effects on man are not so conclusive. The difficulty is in measuring the pressure gradient between two points in the lungs and the flow that corresponds to that pressure.

Dr. Arthur DuBois, University of Pennsylvania, measured pressure in the human lung by sealing the subject briefly in a telephone-booth-like box, a body plethysmograph. From a simple physical equation relating pressure and volume, lung pressure can be obtained. Using this sensitive measuring device, he found that inhaling a fine dust of charcoal powder or aluminum or a mist of India ink increased resistance to airflow two or three times. These substances are not known to be irritating, and the subjects were not aware of any resistance to breathing.

Recent studies use less direct methods based on these principles. It is known that as pressure applied to make air flow out of the lungs increases, the flow diminishes until increasing the pressure no longer increases the flow. If the subject takes in as much air as possible and then blows it out as fast as he can, the maximal rate of airflow can be measured and the effect of pressure can be ignored on the assumption that wide differences in pressure do not influence the maximal flow rate. The maximal flow rate then becomes an indirect way of estimating the flow resistance, and a drop in the maximal flow rate is assumed to indicate a rise in flow resistance.

Dr. Van Sim studied the effects of sulfuric acid mists and SO_2 in human volunteers at the Chemical Defence Experimental Establishment at Porton, England. Conventional pulmonary function tests showed no consistent change but he did observe an increase in airway flow resistance.

Several studies of persons exposed to air pol-

lution have been made in California. Dr. Hurley Motley collected data on patients with severe chronic pulmonary disease while they breathed the Los Angeles air during smog episodes. He found that the lung function of some patients improved when they breathed filtered air.

Dr. Charles Schoettlin assigned by the Public Health Service to the California State Department of Public Health has been measuring vital capacity, timed vital capacity, and maximal flow rate and making clinical evaluations of men at the Veterans Administration Center in Los Angeles. His subjects with chronic disease of the lung are matched for age and smoking history with another group of men without lung disease. These two groups will be compared with respect to their reaction to air pollution and other environmental factors.

Tumor Production

brief Certain epidemiological facets of the increasing incidence of lung cancer suggest that the atmospheric environment may be causally associated with the increase. The epidemiological data indicate areas for experimental biological efforts.

While these experiments necessarily are limited to animals, much significant information can be obtained. Such experiments, by employing large numbers of animals, permit the study of sequential changes in the development of an adverse response. Frequently, it is also possible to assess carefully the factors of host resistance in overcoming these negative effects. Protective or therapeutic measures to control the effects of air pollutants can be quantitatively studied. And, within limits, practically any state of health at any age in man can be duplicated in animals. The ultimate goal of such tests is to select laboratory circumstances most nearly duplicating the human experience.

Despite the existence of many variables, past

Based on a paper by Paul Kotin, M.D., associate professor of pathology, University of Southern California School of Medicine, Los Angeles.

accepted series of guides for safe concentrations of toxic materials in industry has been developed. I need not labor the irrelevance of standards established for these special circumstances to the general pollution situation where persons are exposed for a lifetime and perhaps around the clock, whether ill or well. Eventually we may have sufficient knowledge to set up analogous standards for air pollutants; we do not have such information now.

At present we are confronted with one of the most difficult tasks ever given biologists, extrapolation from doses producing readily measurable responses to lower and threshold levels. The quantitative relationship between dose and effect is practically never a simple linear one. In fact, with most irritant materials there appears to be a "no effect" level; very low rates of dosage can be dealt with by the body's protective mechanisms without damage.

From this standpoint spiking concentrations of relatively brief, high levels may be more damaging than the same amount of materials inhaled uniformly over a long period. Our uncertainty as to the presence of threshold, and if it exists, its quantitative level, is an additional, vexing uncertainty.

Accordingly, we have grounds for suspicion that respiratory irritants may be a significant health concern. Even for the higher concentrations found in our urban areas this is still based largely on inference from the points I have made. An effort consonant in extent with these suspicions is required to clarify the problem.

Lung Function Changes

brief Toxic substances in toxic amounts have not yet been found in community air pollution. What is found are substances in amounts sufficient to cause widespread irritation of the eyes, nose, and throat. What can these substances do to the vital function of the lungs?

Based on a paper by John R. Goldsmith, M.D., head, air pollution medical studies, California State Department of Public Health, Berkeley.

In the lungs and airways water vapor and heat are added to the air so that when it reaches the alveoli, the air is saturated with water vapor and is the same temperature as the blood. The conducting airway is lined with a layer of mucus which is continually moved toward the throat by the beating of tiny whiplike cellular projections called cilia. Larger particles of irritating air pollutants are caught in this mucus, and thus the lung is partially protected. But the smallest division of the airway, the bronchiole, with a diameter of 0.016 inch, has no layer of mucus to protect the cells which form its walls.

We are not certain whether irritants in the air cause the cells lining the bronchiole to swell up, cause the glands to increase their secretion of mucus, or produce contraction of the muscle cells which are wrapped around the bronchiole. Laboratory studies suggest all three effects are possible, and any of these reactions would decrease the caliber of the bronchiole.

One method of estimating the effects of irritating air pollution is to study resistance to airflow within the lung. Resistance to airflow is inversely proportional to the fourth power of the diameter of the conducting tube. For example, a caliber decrease of one-fifth will approximately double the resistance to airflow.

The normal person can greatly increase the amount of air with which gases are exchanged in the lung; the effort needed to produce the increase is kept to a minimum by the low resistance to airflow through the bronchi or bronchioles. An increase in this resistance means that the reserves of lung capacity are available to normal persons only with increased effort. For persons ill with asthma, emphysema, or heart trouble, who have little or no reserves, this added effort may tip the scales unfavorably.

If irritating substances produce edema and thickening of the wall of the alveoli, there certainly may be interference with gas diffusion through this wall. Dr. Geoffrey Carey and his colleagues at the University of Cincinnati have worked out methods for studying this effect and have observed some impairment of the diffusion capacity associated with air pollution episodes in Cincinnati.

The effect of air pollution on lung airway resistance has been studied in several ways. Dr. Mary Amdur at Harvard developed a

method for measuring the effect of gases on the airway resistance of guinea pigs. She found that the presence of minute droplets of common salt solution in the air greatly increases the guinea pig's sensitivity to sulfur dioxide. In salt mist the concentration of sulfur dioxide at which the animals' airway resistance increases is very near that which occurs during episodes in which sulfur dioxide is a major pollutant.

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Despite the existence of many variables, past

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experience has shown a high index of meaningfulness to man of the experimental data for animals.

All available evidence in lung cancer points to a dominant etiological role for exogenous agents present in our respiratory environment. Since cancer rarely develops subsequent to the action of a single factor, atmospheric pollution must be regarded as one of the multiple factors, operating in combination, that result in lung cancer.

The isolation and identification of specific causative agents and the determination of their mode of action have been primarily laboratory undertakings. Following are the accomplishments to date.

- Carcinogenic aromatic polycyclic hydrocarbons have been demonstrated and quantitated in polluted atmosphere of urban communities. Compounds identified include 3,4-benzpyrene and 3,4-benzfluoranthene. These agents have been used to produce skin cancers and subcutaneous sarcomas in C57 Black and strain A mice by painting and injection.

- Carcinogenic properties have been demonstrated in fractions of the atmosphere that are free of aromatic polycyclic hydrocarbons. Compounds belonging to the group of oxidation reaction products of aliphatic hydrocarbons have been used to produce skin cancers when painted on C57 Black and strain A mice.

- Ozonized gasoline has been used in inhalation chambers for the production of lung tumors in strain A and C57 Black mice. These tumors, while differing structurally from human tumors, are nevertheless unequivocally new growths. Their more indolent natural history in mice may well be a reflection of host resistance factors rather than an indication of lack of carcinogenic potency in the aerosols produced.

- Carcinogenic materials have been identified in the air in a particulate state that permits their being breathed and deposited on the lining of the lung. Many of these cancer-producing agents are chemically stable and they survive sufficiently long after emission from pollutant sources to be potential biological threats.

- Atmospheric irritants of all types, for example aldehydes and organic acids, though in themselves noncarcinogenic, may play a role in

the development of cancer by interfering with the normal flow of the mucous stream on the lining cells of the lung. This continual flow of mucus normally serves to prevent the accumulation of deposited material on the respiratory epithelium. Irritants can reduce the activity of the cilia that move the stream along, so that stasis occurs and particle accumulation can follow.

- Protein materials normally present in blood and cells are capable of freeing cancer-producing chemicals from the particles on which they are carried so that biological activity can result.

All of these findings were consistently demonstrable in various species of animals studied. Ample evidence exists to suggest that the behavior observed in the laboratory is closely analogous to the situation occurring in man. It is generally accepted that cancer develops in steps and, logically, any one of the causative links in the chain can be supplied from other environmental sources.

Irritants may come from occupational surroundings, from cigarette smoking, or from the specific biological reaction to repeated viral or bacterial infections. The carcinogenic agent may similarly be derived from other environmental sources. Atmospheric pollution, however, uniquely supplies the links necessary for the experimental induction of lung cancer. Without contrary evidence this observation, coupled with the epidemiological characteristics of the disease, strongly suggests a similar action in man.

Chronic Bronchitis

brief It is difficult to compare the effects of air pollution on the health of the British people with these effects in the United States. The nature and concentration of air pollutants in the two countries differ greatly. For example, in 1952 about 30 percent of the energy derived from mineral fuels in the United States came from coal; in Great Britain 95 percent of this energy was

Based on a paper by Geoffrey C. Carey, M.D., department of social and preventive medicine, Institute of Clinical Science, Queen's University, Belfast, Northern Ireland.

derived from coal, a large portion of it soft coal burned in domestic open fires.

Air pollution levels in a typical city of the United States, such as Cincinnati, are a tenth of those experienced in London smog. Differences in housing and social conditions must also influence the incidence of specific diseases. And there is no good evidence that the diagnosis of chronic bronchitis is based on the same criteria in the two countries.

In the United States there seems to be no clear pattern of urbanization and geographic distribution among States having the highest incidence of chronic bronchitis. In Great Britain the occurrence of this disease, more than any other, increases sharply as one moves from the country through the suburbs to the centers of industrial conurbations. Other factors in the occurrence appear to be cigarette smoking, population density and domestic overcrowding, low socioeconomic status, and sex.

However, it has been demonstrated that patients who suffer from chronic bronchitis, as diagnosed by British criteria, and live in an industrial city in the United States show a worsening of symptoms with increases in air pollution.

The outstanding symptoms of chronic bronchitis are coughing and the production of excessive amounts of sputum, often containing pus. The diagnosis of chronic bronchitis should not be made until other forms of lung disease have been excluded and the patient has had increased cough and sputum either in the winter months or all year round for not less than 3 years.

Chronic bronchitis is an important cause of sickness absence in British industry. In 1951, 27 million man-days were lost from this cause in an insured working population of 25 million. The impact of the disease is even greater, as illnesses of 20 million uninsured persons are not included in this figure. England has the highest reported rate of chronic bronchitis, 65 per 100,000, and the United States the lowest, 2 per 100,000.

The effects of air pollution on health have been and are being studied in several ways in Great Britain. Four major smog episodes have occurred in London since 1948. Each was followed by an increased number of deaths com-

pared with mortality experienced in the same weeks in smog-free years. Nearly 600 excess deaths occurred after the episode of November 1948, 2,500 followed the episode of December 1952, 500 the January 1956 episode, and 400 the December 1957 incident. Very young children, old people, and persons suffering from severe heart and lung disease have been shown to be those most susceptible.

A. S. Fairbairn and D. D. Reid of the London School of Hygiene have studied mortality in the general population of Great Britain between the ages of 45 and 60 years. They reported that deaths from bronchitis are significantly related to visible smog, population density, and domestic overcrowding, and that deaths from pneumonia in men were significantly related to fog and population density.

Examination of the health records of mailmen in Britain showed a significant correlation between visible fog and sickness absence and "bronchitis wastage" (mailmen dying in service or prematurely retired because of chronic bronchitis). Over a 7-year period, the sickness experiences of a 3 percent random sample of executive and clerical government workers were similar to those of mailmen 20 years younger.

Three research groups are now carrying out prospective studies. Dr. P. J. Lawther is following some 200 chronic bronchitis patients of St. Bartholomew Hospital's wards and out-patient clinics. In an interim report he stated that the patients tend to feel worse immediately before the onset of visible fog, and that their symptoms increase and decrease in much the same pattern as simultaneous measurements of smoke and sulfur dioxide.

A Medical Research Council group is collecting daily measurements of smoke, temperature, humidity, and gaseous acid from 29 sampling stations in the city of Sheffield. The measurements are the basis for simultaneous surveys of three groups: the general population of the city, 100 chronic bronchitic patients, and 700 children who entered the first grade in 1956 and will be followed in a long-term study.

In 1957 the College of General Practitioners selected 100 of its members living in areas of varying levels of air pollution to participate in a survey. The physicians are following a num-

ber of patients throughout the year by means of clinical records and objective tests of lung function. Their reports are being collected and analyzed by the Medical Research Council.

Automobile Exhausts

brief Exhausts from gasoline-propelled vehicles contribute pollutants to the air in large quantities. In a particular area, the significance of the quantities is influenced by the availability of diluting air and by meteorological factors which govern the formation of reaction products from the primary pollutants.

In Los Angeles County it has been necessary to assess these pollutants qualitatively and quantitatively. More than 5.5 million gallons of gasoline are used each day and 2,750,000 cars and trucks are registered in the county. Cooperative studies by the Los Angeles County Air Pollution Control District, the automobile manufacturers, the Bureau of Mines, and other agencies leave no doubt that automobile exhaust is a source of air pollution.

On the average, 1,000 gallons of gasoline consumed in automotive engines releases the following substances to the air:

Substance	Number of pounds
Carbon monoxide.....	3,200
Organic vapors.....	200-400
Oxides of nitrogen.....	25-75
Aldehydes.....	18
Sulfur compounds.....	17
Organic acids.....	2
Ammonia.....	2
Solids (zinc, lead, other metallic oxides, carbon).....	0.3

However, individual cars vary substantially in the amount of pollutants they produce, according to engine, fuel, and operating variables.

The significance of these substances does not depend entirely on weight. If the air movement is sufficient to dilute the waste products, their concentration in the air may not reach the objectionable level. Therefore, data on Los

Angeles cannot be applied to other areas without considering factors causing dilution.

In Los Angeles the relative capabilities of these substances for reaction to form new products must also be considered. For several years it has been known that some organic compounds react photochemically to produce ozone, oxidation products such as aldehydes, and various transient and stable secondary products. Recently, methods based on infrared absorption and gas chromatography have helped to determine the relative participation of various organic molecules in the reactions of smog formation.

Certain unsaturated organic compounds appear to be more important than others in producing secondary reaction products. The possibilities of selective removal or elimination of these fast reactors should not be overlooked.

An automobile also loses substantial quantities of gasoline vapors from fuel tank and carburetor vents. The losses from both sources are minimal at temperatures of 80°F. But at 95° to 100°F., temperatures which often coincide with periods of most intense smog, the carburetor evaporation losses from Los Angeles driving approximates 40 tons of gasoline vapors an hour, a rate roughly equivalent to hydrocarbon losses from the exhausts. Tank evaporation contributes additional but lesser quantities. However, the vapors may contain less unsaturated hydrocarbons than the fuel being used.

The automobile engine is a major contributor of oxides of nitrogen, essential ingredients of the smog-forming reaction. Some authorities maintain that emissions of oxides of nitrogen as well as hydrocarbons must be reduced to abate the smog successfully in Los Angeles.

The large amounts of carbon monoxide emitted from exhausts are a benefit and a potential danger. In concentrations of more than 150 ppm it is a health hazard. In any concentration, CO affords a useful index of the distribution and degree of dilution of other constituents of exhausts. This is possible because exhaust emissions are, overwhelmingly, the principal source of CO, and the gas does not appear to be consumed by reactions in the atmosphere.

Any metropolitan area with petroleum-powered vehicles as the basis of its transporta-

Based on a paper by Leslie A. Chambers, Ph.D., director of research, Los Angeles County Air Pollution Control District.

tion receives the same primary exhaust pollutants per 1,000 operating vehicles as Los Angeles. In some areas the resultant concentrations may be tolerable. In Los Angeles these exhausts are basically responsible for serious community air pollution. The pollution will increase with the number of automobiles until an effective means is found to eliminate substantially some constituents of the exhaust.

Automobile Industry

brief Air pollution affects the automobile industry somewhat differently than any other.

In manufacturing and selling almost 70 million motor vehicles now operating in the United States, the industry has encountered several aspects of air pollution abatement.

The early 1- and 2-cylinder primitive automobiles trailed billowing clouds of smoke, and by eliminating this smoke the industry achieved its first success in abating air pollution. In the 1920's, undesirably high concentrations of carbon monoxide developed during peak traffic congestion in some large cities. In the 1930's this concentration was reduced as much as 50 percent in some cities solely by increasing the efficiency of fuel-burning in gasoline engines.

The high-compression engine required gasoline containing tetraethyl lead, which created the possibility of a new hazard. After laboratory research by industry and the Bureau of Mines, the top limit of lead concentration compatible with public safety was determined and promulgated.

In the past decade, certain invisible, hard-to-measure emissions under certain atmospheric conditions and intense sunlight have been found to combine with portions of the air into something that is blamed for reduced visibility, irritation of the eyes, and other effects. To the extent that these effects are due to tailpipe emissions, they are as undesirable to us as to others.

Based on a paper by Harry A. Williams, managing director, Automobile Manufacturers Association, Detroit.

The automobile industry has authorized cooperative research, spending about \$1 million a year for the past 5 years. Some devices have been developed which show promise in the laboratory stage. Any that prove practical enough to be put into production will, of course, be marketed.

To find the cause of the undesirable emissions, basic studies of combustion have been made. Some emission seems to be unavoidable. At present, motor vehicles in the hands of users are being studied to determine if maintenance procedures can reduce typical emission. The issues that may be involved, an individual car owner's free choice of how he uses or abuses his car, are social and economic as well as scientific.

We have good cause to hope that this research will help to discover the cause of these undesirable effects and what is needed to control air pollution in every area that is affected.

Steel Industry

brief Recent accomplishments illustrate what the steel industry has done and is endeavoring to do to abate air pollution.

In 1950 the situation was less than ideal. The conditions of pollution were not even defined because there were no simple, effective, inexpensive instruments which could take a truly representative sample of the ambient atmosphere or of stack gases. That year the American Iron and Steel Institute, in behalf of the industry, signed a contract with the Industrial Hygiene Foundation of America to develop such instruments.

As a result, investigators devised an automatic smoke filter which samples the atmosphere for short periods and permits the tracing of variations in smoke intensity, a hydrogen sulfide sampler, and an instrument for measuring hourly dustfall rates.

A critical examination revealed that no one existing device enabled the industry to meet all

Based on a paper by Max D. Howell, executive vice president, American Iron and Steel Institute, New York City.

the requirements for clean air. A research project at the Harvard School of Public Health developed a new type of continuous self-forming filter revolving on a horizontal plane. It combines the versatility of a scrubbing or washing device for gases with the high efficiency of a fiber filter for particulate matter. The wools, made of blast furnace slag, are reusable and 90 percent efficient. Three pilot filters have been built and tested and a fourth is being designed.

Although the institute became actively interested in the control of air pollution in 1950, individual steel firms began much earlier to seek out and correct obvious causes of air pollution. Steam boilers were converted from coal to gas, and process heating furnaces to natural gas or electricity. Locomotives, cranes, and river boats were powered by diesel rather than steam engines.

Air is the raw material used in the largest quantity by the steel industry. More than a billion tons of air, which must be returned to the atmosphere, are used to produce 100 million tons of steel. In many instances the discharged air contains coarse and fine particles which originate in the mechanical and chemical reactions of the manufacturing processes. These particles are not the result of inefficient or sloppy practices. They are inherent in the steelmaking process.

Coke ovens have been and are sources of smoke. Those built in recent years have equipment to shorten the time of charging, vacuum charging equipment, equalizer mains, and self-sealing doors to minimize emissions. But older ovens do not lend themselves to the addition of such protective equipment.

Blast furnaces emit about 150,000 cubic feet of gas per ton of iron. With protective devices added to the furnaces, their gases contain less than 10 pounds of dust per ton. Dust catching equipment now used includes gas bleeders, venturi and orifice scrubbers, and electrostatic precipitators. One company spent \$3 million equipping four blast furnaces with precipitators and \$200,000 for gas bleeders. Another spent \$700,000 equipping two furnaces for high top pressure and installing venturi-type wet washers.

The effluent from open-hearth furnaces is the

industry's biggest and most persistent source of pollution. The United States has 926 open-hearth furnaces, representing 88 percent of the industry's steelmaking capacity. About half the dust from an open-hearth furnace is less than a micron in size and mechanical cleaners do not eliminate it effectively. Precipitators, high energy scrubbers, or filters may be required.

Four installations presently operating effective open-hearth gas-cleaning use waste-heat boilers to reduce gas temperature and electrostatic precipitators to do the cleaning. The initial installation was trouble free, but the three subsequent ones required modifications. Precipitation of dust from an open-hearth furnace still appears to be more of an art than a science.

One company equipped nine open-hearth furnaces with electrostatic precipitators at a cost of \$5.5 million. Another spent more than \$7 million adding automatic fuel and combustion control equipment to 41 open-hearth furnaces.

The new basic oxygen steelmaking process requires special equipment to suppress effluent. Spark traps and wet washers followed by moisture eliminators installed in a new 1-million-ton capacity plant cost \$2.2 million. Other companies use dry electrostatic precipitators to clean gases.

The most popular type of air-cleaning device on electric furnaces is, in effect, a giant vacuum cleaner. Dust is collected in 15-foot bags in a baghouse as the air passes through them. The bags are shaken vigorously and the dust falls into a hopper where it is mixed with water to form sludge. This type of installation, which can also be used in the basic oxygen process, is highly efficient.

Many other operations of the steel industry employ devices to reduce air pollution. Some examples are electrostatic precipitators in boiler houses, water sprays on car dumpers at ore- and coal-handling facilities, cyclone cleaners and water sprays in sinter plants, scrubbers on coal pulverizers and coal washers, waste gas controls at soaking pits, and cyclone dust catchers, electrostatic precipitators, and wet washers on scarfing beds and scarfing machines.

There is much research in progress. Old problems remain and new ones will arise. The

steel industry will attempt to solve them as speedily as possible.

Chemical Industry

brief For the chemical industry, the avoidance of air pollution and the proper use of air are conditions of doing business. Chemical producers know that many of the substances they use or produce are hazardous, and that safety of employees, neighbors, and customers must be a primary consideration. This concern undoubtedly accounts for the fact that the chemical industry has one of the best safety records in the world.

Avoidance of air pollution begins in the laboratory with the development of a process and continues through plant and process design, operation, and maintenance. A survey of the engineering departments of a representative group of companies revealed that the lowest estimate of the cost of air pollution control or avoidance is from 1 to 1½ percent of all production costs, including amortization of investment in equipment, operation, and maintenance and excluding the cost of research. We can conservatively estimate that the chemical industry spends \$200-\$250 million a year for the control or avoidance of air pollution.

The development of new processes is one of the key factors in the industry's successful attack on air pollution. Ours is a highly competitive business and efforts to develop new and more efficient processes are continuous. Since the investment in pollution control equipment and the cost of its maintenance are frequently so high, chemical engineers seek to eliminate the need for such expenditures. Of course there are continuing efforts to improve control in older processes and operations which still have useful life, and it is necessary to design, install, and operate control equipment in new processes if the process itself cannot avoid generation of pollution.

I do not mean to imply, however, that the problem is not still very much with us. We feel

Based on a paper by Gen. John E. Hull, USA (Retired), president, Manufacturing Chemists' Association, Inc., Washington, D.C.

we must continue extensive work in research and education. If only because of the know-how we have gained we have an obligation to help end air pollution not directly connected with the production of chemicals. We also have an obligation to help regulatory officials and legislators draw up and administer laws and regulations that are workable and realistically in the public interest.

The industry, through the Manufacturing Chemists' Association, has conducted workshops and conferences for people in the industry and for regulatory officials. Among its published works is the "Air Pollution Abatement Manual," a definitive compendium, kept up to date by frequent supplements. Another booklet, "A Rational Approach to Air Pollution Legislation," sets out recommended principles to be used in drafting air pollution legislation. The association also makes available experts in air pollution control to help prepare legislation or regulations and cooperates actively with government and private research agencies.

Scientific investigation probably offers the best hope for sensible and effective control of air pollution. But air pollution cannot be solved without honest, accurate public understanding; here we have been less successful. Our responsibility is not only to do the best we can to avoid air pollution but also to be honest and forthright in these matters in dealing with the public. Objective reporting, based on full scientific knowledge and understandable conclusions, is the only kind that will assist in making real progress.

Florida Phosphate Industry

brief Industry needs to intensify its research in air pollution and in control efforts. It must also inform the public of its achievements to gain an understanding ally.

This has been the experience of the phosphate industry in Florida where a pattern of industry-

Based on a paper by Howard F. Roderick, vice president, Phosphate Chemicals Division, International Minerals and Chemical Corp., Chicago.

community cooperation emerged after a period marked by complaints and damage suits.

Supplying 70 percent of the Nation's output of phosphate, growing citrus fruit, and raising cattle are the principal activities in Polk County in central Florida. The phosphate rock, which contains 2 to 3 percent fluorine, is strip mined, piped in slurry to refineries where it is dried and processed, and shipped in various forms. Cyclone collectors, precipitators, and bag collectors are used to collect the dust raised during drying and handling.

Recently the production of triple superphosphate, a highly concentrated fertilizer, has increased so rapidly that the State is now responsible for 80 percent of the Nation's output.

As the population of the county grew in step with the increase in the production of phosphates, complaints about air pollution multiplied. Citrus growers and flower growers complained about fluorine damage to crops and cattle raisers about fluorosis in cattle.

In 1955 the Florida State Legislature created a joint committee on air pollution to conduct hearings. Two years later a State law created an Air Pollution Commission. By this time several damage suits had been filed against the phosphate companies.

The phosphate producers in Polk County took no joint action until 1955, although they had invested an estimated \$6 million in effluent control equipment. My firm, International Minerals and Chemical Corp., began control measures when its plants started operating, and, by July 1959, will have spent more than \$3 million on modern waste control equipment which costs \$250,000 a year to operate.

Our research laboratory also did leaf sampling and evaluation studies to determine the cause and nature of alleged crop damage. We later found that these were pioneer studies of air pollution damage to citrus crops.

However, the mineral producers in Florida failed to recognize that the public blamed the entire industry for the air pollution and ignored a single company's efforts at control. The industry also failed to keep the public informed of the work that had been done.

Both failures have now been remedied. A Florida Phosphate Producers' Committee, formed initially to represent the six participat-


ing members at the hearings of the State legislative committee, has become a permanent organization.

It has two purposes. The first is to conduct expert, impartial scientific research into the causes and effects of air pollution in Polk County. A Washington firm, retained to do this job, has set up a field laboratory and is conducting extensive studies in the county.

The second purpose is to inform the public about the industry. A local public relations agency was hired to counsel and direct public information activities for the producers. Interviews with researchers and stories about the research work, control activities, and the industry's economic importance to the community have gained greater public understanding of the difficulties of solving air pollution.

While the final outcome of these actions is yet to be judged, I think the interim results are significant. They indicate that industry will participate in a soundly directed search for the facts concerning air pollution.

Economic Aspects

 Losses from air pollution in the United States are estimated at \$3 to \$4 billion annually. About \$300 million is spent for control each year. These figures may not be completely accurate, but they indicate the magnitude of the economic problem.

Air pollution control has grown from consideration of smoke and fly ash to encompass the total environment. Similarly, experts concerned with improving the air have developed their skills. They now have professional standing and use portions of several academic disciplines in their work. The education of such technical personnel has only begun, but it has already made possible an increasing body of research and know-how that has solved many complex control problems.

But educating industry and the general pub-

Based on a paper by William R. Bradley, M.S., assistant director of environmental health, central medical department, American Cyanamid Co., New York City.

lic to evaluate realistically their air pollution potential has not kept pace with the training of professional personnel. General application of present knowledge is lacking. It is time that the economic benefits and burdens of control for both industry and the public are understood and appreciated.

Industry has sponsored many educational programs in pollution abatement. Such voluntary efforts in self-education and the work of scientific organizations have prompted the spending of large sums for research. The majority of industries have demonstrated their cooperation in efforts to obtain cleaner air and consider that properly constituted and fairly administered control legislation will serve as a spur to the recalcitrant. But the general public has not taken comparable steps in self-education. Certainly, complaints have outstripped the development of an understanding of the economic and social benefits deriving from abatement.

For example, many people realize that burning household rubbish and wastes in open dumps causes smoke and odor and creates a breeding place for rodents and insects. But the cost of proper incineration facilities for a municipality is staggering to them and they do not always vote funds for such facilities.

Many municipalities do not realize that the cost of garbage and refuse disposal in a sanitary landfill is approximately one-third the cost of operating proper incineration equipment. In some areas a sanitary landfill can convert marginal land into parks or industrial sites that will eventually pay their own way.

The public contributes to air pollution by its use of automobiles, heating fuel, and backyard incinerators. An informed public can help to eliminate contaminants. We know the facts about abatement, but what is the best way to disseminate them? How soon the public insists on more economical disposal of these wastes depends largely on how effectively it is informed.

Savings in Industry

Industry can best be approached by making it aware of the economy that accrues when control is planned in the blueprint stage of a new

plant. Today most dollars spent on control and equipment are written off as part of the cost of doing business. But there is a trend for increasing returns from dollars spent on control. Industry's resourcefulness has made many control installations profitable through the recovery of usable byproducts.

One plant installed a steam stripper to remove volatile benzothiazole that caused a neighborhood nuisance. The steam stripper cost approximately \$85,000; the benzothiazole recovered annually is worth about \$50,000.

The baking ovens in an enamel coating metal strip operation gave off pungent solvent fumes. Installing a catalytic oxidation unit to burn these fumes saved considerable fuel, increased production 400 percent, and lowered insurance rates 95 percent. The \$30,000 investment has more than paid for itself and in addition has gained the priceless commodity of neighborhood goodwill.

Detroit-Edison, which burns about 5.5 million tons of coal a year, has created a market for fly ash. It reacts with lime to form a durable, cementlike substance and in 1957 the company sold 105,000 tons, at \$1 a ton. Dumping the fly ash would have cost the company \$78,000. Fly ash is now used in ready-mix concrete, building blocks, slag and clay bricks, roadbase choking material, filtering media, metal polish agents, and mild abrasives, and for sand blasting and land-fill reclamation. An old liability is becoming a new asset.

A mineral processing company spent \$8,000 to install equipment to collect fines lost in grinding operations. The company hoped to write off the expenditure in 2 years, but the recovered dust was of such exceptional quality it brought \$5 a ton more than the original product. The control process grosses about \$25,000 a year.

An alfalfa mill owner learned that the cattle he grazed behind his elevators preferred alfalfa fines to their usual hay and molasses. Tests revealed the fines' protein content was higher than the regular product. Dust collection is now earning its own way.

Despite what has been accomplished, by-product recovery and development is only in its infancy and large economic rewards from abatement are yet to be realized. From industry's

dollars spent on research in abatement will come the solution of many problems for industry and for the general public.

Goals

Our goals for the future might be:

- A program to expand the education of more personnel in the profession of air pollution abatement.
- A program to inform industry and the general public of the economic benefits abatement makes possible.
- Establishment of a center to collect and disseminate existing know-how concerning abatement.
- Channeling of research funds into studies of byproduct recovery and development processes and of less expensive abatement techniques.
- Establishment of liaison between government and industry that will break down restraints or fears of punitive measures and replace suspicion with cooperation.
- Creation of a team approach between the public and industry toward cooperative responsibility and effort in abatement.

These goals, while long range in scope, can be inaugurated today so that dividends of cleaner air, mutual trust and understanding through education, and a desirable economy eventually will accrue.

Levels of Responsibility

brief The constitutional basis for control of air pollution rests with the police power of the States. Under the Constitution this power of the States includes the power to protect the health, welfare, safety, and general welfare of their inhabitants. While the police power is limited by the 14th amendment, if legislation regulating air pollution is reasonably necessary for the public welfare, it will be interpreted as a valid exercise of this power.

Nor is such legislation invalid because it might put someone out of business or require a large expenditure of money. (*Northwestern*

Laundry v. Des Moines, 239 U.S. 486, 36 S. Ct. 206, 60 L. Ed. 396).

Whether it is feasible for the State to take an active part in air pollution control depends on the locality. In 1947 California adopted a statewide statute but left actual enforcement to local air pollution control districts on the county level. This type of enabling act has since been adopted by Kentucky, New Jersey, Massachusetts, Oregon, Washington, Delaware, New York, and Florida.

The purpose of such State laws is to maintain a reasonable degree of purity of the air resources consistent with public health and welfare. Air pollution is generally defined as the presence in the air of contaminants, put there by man, in quantities and of a duration to cause discomfort to a substantial number of citizens, or which are injurious to human, plant, or animal life or property. Standards for quality and quantity of pollutants and the framework for enforcement are usually included.

The California act provides for an air pollution control district in each county to be activated only if the county board of supervisors finds that local ordinances cannot handle air pollution adequately. The board of supervisors, sitting as an air pollution control board, is vested with power to make all regulations necessary to accomplish control or abatement, or both. An air pollution control officer appointed by the board is empowered to enforce the regulations as well as the State law.

These statutes are admirably suited to a one-county problem. However, California's basic act was amended to permit counties, by appropriate action, to merge or consolidate into an overall air pollution control district. In 1955 a district comprising nine counties in the San Francisco Bay area was created by special action of the California legislature.

That year California also recognized a statewide responsibility to supplement local activity in research. The State health and safety code now provides that the State department of public health shall maintain an air sanitation program which includes study of health effects of air pollution, determination of physiological effects of air pollution on plant and animal life, determination of factors responsible for air pollution, monitoring of air pollution, de-

Based on a paper by Harold W. Kennedy, county counsel for Los Angeles County, Calif.

velopment of administrative means of control of air pollution in emergencies, and assistance to local agencies in effectuating all of these activities.

Delaware and Oregon have gone beyond the enabling act at the State level. Both have a statewide air pollution control body to make rules and regulations and provide machinery for statewide enforcement. Oregon's regulations also encourage local control programs wherever feasible.

States vary in the responsibility that they have accepted for air pollution control. Some leave the matter completely to local authorities. Most States with economies substantially dependent on heavy industry have accepted responsibility for providing enabling acts, encouraging local control programs, and creating standards by which local programs may operate.

Local Programs

Recently it was estimated that 9,500 communities in the United States had air pollution problems, but only 2,050 had adopted any legislation aimed at control. Doubtless only a small minority have enacted comprehensive programs, yet local ordinances account for 80 percent of the control programs in the Nation today.

Air pollution legislation is one of two general types or a combination of them: mere punitive ordinances setting degrees of penalties for violation of laws and regulatory ordinances whose object is abatement by prevention of the discharge of pollutants into the atmosphere. Punitive ordinances were relied upon for years, but those which attack the situation at its source are now favored.

New York City, Baltimore, Richmond, Va., and East Chicago, Ind., have recently adopted comprehensive codes including permits and inspection procedures. Because air pollution is not confined by a city's boundaries, Los Angeles and Cincinnati found it necessary to make compacts with nearby communities for cooperative control measures.

An alternative solution to such a problem is to seek State legislation providing for the creation of an air pollution control district at a higher political level than the individual city

or county. The California statute provides for such districts in each county or combination of counties.

It must be recognized that any sound program of air pollution control must be tailored to the area. Size, population, industries, nature and extent of the pollution, and the funds available must be considered. Within the local programs there may also be separate levels of responsibility for rulemaking, enforcement, hearing and deciding individual cases, and an advisory function.

The primary responsibility for administration of an effective control program rests upon local authorities in most instances, but if the local authority is too small in relation to the size of the problem, it will fail unless it receives cooperation from its neighbors or assistance from some superior governmental agency.

Regional and Federal Action

If the effects of contaminants transcend the boundaries of a particular State, no solution is possible without Federal control or an interstate compact. The Constitution states, "No State shall, without the Consent of Congress . . . enter into any agreement or Compact with another State. . . ." The courts have held that this consent may be given after as well as before the agreement between States is made. (*State v. Joslin*, 116 Kan. 615, 227 Pac. 543). Since serious air contamination is seldom solved without enforcing laws, adequate control for adjoining industrial areas in separate States must contemplate some form of regional control.

Although the control of air pollution is not among the powers explicitly given to the National Government by the Constitution, neither is the protection of public health nor the prevention of pollution in streams. However, Congress has legislated to accomplish both these aims.

The commerce clause of the Constitution would be the most reasonable provision upon which to base the control aspects of a national program of air pollution control. Essential to the use of the commerce power is that the subject of the legislation or something closely related to it crosses State lines.

Also, Public Law 159 expressly affirmed "The policy of Congress to preserve and protect the primary responsibilities and rights of States and local governments in controlling air pollution, to support and aid technical research to devise and develop methods of abating such pollution, and to provide Federal technical services and financial aid to State and local governments, air pollution control agencies, and other public and private institutions in the formulation and execution of their air pollution abatement research program. . . ."

As the contamination of our atmosphere increases in intensity, it is obvious that the various levels of government must assume additional burdens to end the threat to a basic natural resource, the air we breathe.

Adequate Monitoring

brief There is no simple formula for the right amount of air monitoring in a given community at a given time. The optimum level of monitoring is the balance between the need for information on the state of the air and the cost of obtaining this information. Inadequate monitoring could permit another Donora to occur, but superfluous and ill-planned monitoring is a serious, expensive waste.

In this paper, monitoring is defined as continuous routine measurements of air quality as distinguished from a small number of samples taken for research. Pollen counts and radiological measurements are not considered.

An estimated \$1.5 million a year is now spent on monitoring in the United States. About 10,000 communities are said to have some sort of difficulty with air pollution.

The Register of Air Pollution Analyses, published by the Public Health Service, includes all known sources of monitoring, excluding that done by industry for its own protection, up to January 1, 1956. It lists 194 communities in which measurements were made. These were

located in 30 States, the District of Columbia, and Hawaii. The Register also shows that 150 urban areas measured some aspect of particulate pollution, 81 measured gaseous pollutants, and 40 had data, not always simultaneous, for both gases and particulates.

Although the passage in 1955 of Public Law 159, the Air Pollution Control Act, undoubtedly increased activity, it seems unlikely that more than 400 cities now conduct monitoring. However, continual sampling and analysis of the air of 10,000 communities may constitute, both scientifically and economically, too much monitoring.

Monitoring has four functions: to signal the existence of pollution, to identify sources, to indicate trends, and to warn of air pollution emergencies. By its nature, monitoring is somewhat inflexible in the amount of information it yields and is often less suited to the needs of a community than spot sampling and analysis. The overall complex of pollution—malodors, excessive dust, smarting eyes, and decreased visibility—is easily detected, and monitoring can only confirm what is already known: that pollution exists.

Data obtained by air analyses can yield information on the sources of pollution. However, a clever scientist should be able to find most sources of pollution in a few days of suitable weather. It is futile to perform analyses year after year to show pollution from a given source if nothing is done to control emissions.

Monitoring can yield information about the trends in the concentration of pollutants. However, consider an actual case, a small town deluged with ashes from a sawdust incinerator. The source was detected in a few months' work, and after controls were installed on the incinerator, dustfall was reduced 90 percent. Are continuing analyses necessary?

Monitoring as a warning of a disaster caused by pollution is necessary if there is a reasonable probability of disaster. But what is a "reasonable probability?" A few years of monitoring can indicate the numerical probability of a given concentration of pollutants, but are full-scale analyses justified for a warning which will be sounded once a century?

Probably the occurrence of dangerous levels once every 10 years, or good evidence of in-

Based on a paper by James P. Lodge, Ph.D., chief, Chemical Research and Development, Air Pollution Engineering Research, Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati.

creases in pollution toward these levels, make a warning system defensible. But perhaps only a single substance needs to be monitored.

The principal justification for monitoring, then, must be the determination of trends in air pollution in cases so complex that trends are not obvious. Any other information from monitoring operations must be regarded as a byproduct.

However, if present monitoring programs are measured against these four functions, they must be considered inadequate. Some areas are overmonitored or wrongly monitored, or both, and many communities with serious and complex problems lack facilities for even the most cursory examination.

In many situations, routine measurements of air quality over a finite period, such as a year, to establish base levels can serve very well. The levels may then be compared with subsequent spot measurements.

Consequently, we should examine the existing routine analyses, define their aims, and see if they are the best and most economical method of achieving these aims. We need to determine where monitoring is actually required. And we need research to produce the analytical methods and tools that will make monitoring less expensive and to devise control equipment that decreases emissions to the atmosphere.

A Rational Approach

brief The rational approach to control of atmospheric pollution in any specific area is based on two precepts: reasonable use of the atmosphere for the disposal of airborne waste materials and sufficient control of pollution to prevent a nuisance or a detrimental effect on health or property.

In developing criteria for the application of control equipment and techniques, the nature and scope of the pollution must be clearly understood. Air pollution is generally complex because of variations in the character of

the contaminants, the diversity and intermingling of industrial and community sources of pollution, and the influences of topography and weather on its distribution and concentration.

Difficulties also arise from variations in the effects of contaminants on man, animals, vegetation, and property. These effects may be experienced in only a small area near the source or over an entire region.

The majority of foreign substances discharged to the atmosphere by the activities of man combine in effect to produce contaminants which are classified as aerosols or gases. Aerosols are the solid and liquid particles generated by combustion, mechanical action, and chemical reaction. They reduce visibility, cause damage to property and to vegetation, injury to animals, and, to an unknown extent (at least at present), affect the health of man. Gaseous contaminants are believed to be significant in relation to effects on health and damage to property and vegetation, and as nuisances.

Sources of pollution tend to be grouped at centers of population, and thus to be concentrated within a given area, but topographic and meteorologic factors may cause the pollutants to be widely dispersed.

A cursory examination of the air pollution problem would favor establishment of universal concentration limits at the source. But such an approach is invalid both technically and economically since it would require all areas to meet the degree of control required for the most susceptible area. Furthermore, the concentration of pollutants at the source is not an acceptable measure of the effects.

However, a baseline limit above which pollution concentration is not tolerable under any conditions should be set. Two factors must be considered in setting such a limit. One, the degree of control for any single source must be such as to prevent obvious damage to property and vegetation, obvious injury to animals, and obvious detriment to health. Two, the limit established for each industry must prevent the combined sources within the area from causing serious damage to property and vegetation, serious injury to animals, and any detriment to health under the most adverse weather conditions. The maximum limits of tolerance must

Based on a paper by Andrew H. Rose, Jr., chief of engineering research and development, Air Pollution Engineering Research Program, Robert A. Taft Sanitary Engineering Center, Cincinnati.

be continually revised on the basis of new knowledge or changes in the affected area.

The engineering approach is to limit pollutants at the source so that the combined concentration from all sources in the environment will not be detrimental to health and property or cause nuisances, while allowing the atmosphere to function as an acceptor of emitted waste.

A high degree of control at the source is not always feasible within the economic capabilities of the specific area. It must be recognized that the costs of source control are borne indirectly by society but that the costs of the effects of air pollution in the environment are borne directly. Successful application of control at the source must therefore depend on the sagacity of a compromise between the cost and the desired end.

Citizen Participation

brief

In the past 6 years, Philadelphia has developed a practical program of air pollution control by involving the community in basic policy decisions.

Experience has convinced us that lay participation in planning control measures is healthy, sound, and one of the best ways to explore and use community sentiment.

Philadelphia's Home Rule Charter, adopted in 1951, directed the Air Pollution Control Board, an 8-man advisory body to the health department, to prepare a comprehensive code for submission to the city council. The legislative base for public health laws rested on miscellaneous municipal ordinances, some dating back to the 19th century. The Air Pollution Control Code, adopted in 1954, grew out of this mandate to review, consolidate, and improve the city's ordinances. Specific regulations were later appended to the code.

Community participation began with the drafting of the code, which was thoroughly reviewed by industry and the lay public in the course of its adoption. Primary assistance came from the chamber of commerce and civic organizations.

Based on a paper by Donald C. Wagner, managing director, City of Philadelphia.

We found that using adequate community representation to help draft the code and regulations avoided many later difficulties. Such representation provided the administrator with a means of educating key members of the community as well as giving him a sense of what the citizen expected from the proposed legislation.

Adequate representation also led to an accommodation of conflicting points of view. Later when the proposed legislation was discussed at public hearings, members of the community as well as the administrator and the legislator defended its validity, fairness, and reasonableness.

When the regulations went into effect, the industries which had participated in the drafting were, if not enthusiastic, at least well informed about them, and the individual attitudes that industry's representatives displayed in advisory committee meetings had already been softened in group discussion. Finally, citizens' participation made available to the city the best talent in the community, talent which, ordinarily, could not be purchased.

Two examples of our methods follow. Open burning at dumps and auto wrecking yards was ended January 1, 1958, in Philadelphia. While the city was still involved in a legal battle over the ban on burning refuse, an advisory committee began writing regulations for sanitary landfill, which would replace burning as a means of disposal.

The committee included the operator of a dump, an attorney who was contesting the ban, a professor of civil engineering, a person experienced in city planning, the engineer in charge of the municipal incinerator, a member of the chamber of commerce, and two citizens who were familiar with the advantages of various methods of refuse disposal. Despite some strongly anti-theoretical points of view, the members drew up a set of regulations that were in the public interest and later were unopposed at public hearings.

In investigating rendering plants, the staff of the air pollution control section found that the general insanitary conditions as well as the plant odors necessitated a comprehensive approach.

The staff drafted regulations that they considered ideal, and a 15-member advisory com-

mittee reviewed them before appointing a subcommittee to work on them. The latter group included the owner of a rendering plant, an attorney representing the industry, an industrial physician, an official of the union that represented workers in the industry, and a veterinarian. They reviewed the draft and recommended changes and additions.

Their draft was again reviewed by the parent committee, inspected by the board of health, the top-level citizens advisory body, and the Air Pollution Control Board. This process, if somewhat prolonged, resulted in regulations that satisfied staff and industry and that were uncontested in public hearings.

Such procedures have worked in Philadelphia. For some reason, the logical processes of a group differ substantially from the thinking of the individual persons in the group. Each person is willing, or forced by the dynamics of

the situation, to abandon some personal interest in favor of a solution satisfactory to all.

We have also found that if an agency expects assistance from industry, the agency must be ready to reciprocate by acting as a consultant in air pollution control. Because of its contacts and experience, the agency is often able to point out pitfalls and indicate methods of control that have succeeded previously. The agency's function as consultant thus aids in preventing air pollution and eases its task of enforcing regulations.

As evidence of the success of these methods, in the past 6 years we have eliminated open burning on dumps, initiated a multimillion-dollar incinerator system, abolished coal-burning engines and industrial smokestack nuisances, and guided industries in installing major control facilities. The air in Philadelphia is measurably improved.

Status of Fluoridation in Community Water Supplies

By the end of 1958, 1,778 communities, supplied by 960 water systems, had adopted the procedure of adjusting the fluoride content of their drinking water. This represents a gain for the year of 4.2 percent in the population protected by controlled fluoridation.

During 1958, 145 communities with a total population of 1,449,155 adopted fluoridation. These places include Mobile, Ala., Peoria, Ill., Atlantic City, N.J., and 142 smaller cities and towns scattered throughout the United States. During the year, two communities with 15,000 persons discontinued fluoridation, the smallest number to suspend fluoridation in any year since 1951.

The communities which adopted fluoridation during 1958 include 9 cities with populations of 25,000 to 250,000, 96 communities with populations of 2,500 to 25,000, and 46 towns with populations of less than 2,500.

It is estimated that approximately 118 million people are using water from community sources. Of this number 35,240,000, or about 30 percent, are drinking water with controlled fluoride concentrations which provide optimum protection for preventing dental caries. In addition, about 7 million people obtain drinking water from community sources which naturally contain the recommended fluoride concentrations.



British Caribbean Water Supply

EDWARD W. MOORE

ALTHOUGH the geography, geology, and meteorology of the British Caribbean territories vary so much that generalizations cannot be made about the quantity and quality of their water supplies, there are some common administrative problems relating to these supplies.

The territories to which I refer consist of British Guiana and the newly created West Indian Federation, which comprises Trinidad, Jamaica, Barbados, and the Leeward and Windward Islands. The federation represents a land area of 8,000 square miles, containing a population of about $3\frac{1}{2}$ million. British Guiana has 83,000 square miles and less than a half million population.

One of the common problems of these territories is lack of sufficient money with which to develop waterworks that would approach United States standards in quantity and quality. Only the larger territories, such as Jamaica, with its bauxite, Trinidad, with its

oil and asphalt, British Guiana, with its bauxite and timber, and Barbados, with its rum and profitable tourist trade, appear to be exceptions. The smaller, primarily agricultural islands have to sacrifice both quantity and quality to a dangerous degree.

A second problem, which tends to exaggerate the effect of the first, is the nearly complete absence of a technically educated, subprofessional group to serve as operating, maintenance, and clerical staff. The load placed on the well-trained engineers at the top, as a result of the situation, is appalling, particularly in the smaller islands. It is not unusual to find one man responsible for roads, docks, waterworks, airfield construction, and erection of power stations. These responsibilities might not be too burdensome were it possible to delegate details to subordinates, but in many situations this is either impossible or inadvisable.

Standards of operation of the waterworks were observed to be low, with some notable exceptions in the larger islands where industry has created a market for and consequently a supply of subprofessional technicians. Most of their training is on the job, for almost no adequate trade schools or technical high schools exist. Maintenance of plant and equipment is particularly difficult under these circumstances. Many well-designed water systems cease to operate properly not long after completion.

The third problem relates to the very peculiar attitude toward wasting water which was encountered in all areas except one. Very few supplies (and these only partially) are metered. The proportion wasted is certainly very high, although it is not possible to get figures.

In general, the waterworks engineers seem

Mr. Moore, who is a lecturer on sanitary engineering at Harvard University, presented this paper in slightly different form before the Committee on Sanitation and Environment, Division of Medical Sciences, National Academy of Sciences-National Research Council, on October 7, 1958. His remarks are based on observations recorded when he and Prof. George T. Bryant of the Johns Hopkins University conducted a refresher course for waterworks engineers in the British Caribbean territories. The course, which ran from March 17 to June 6, 1958, was sponsored by the Pan American Sanitary Bureau, Regional Office of the World Health Organization, in cooperation with the government of Trinidad and Tobago.

apathetic about wastage. In many cases, the result is periodic failure of the water supply. In Port of Spain, Trinidad, which is a modern city in other respects, the mains in certain areas were empty a large part of every day during the time I stayed there. From time to time, rather feeble educational campaigns are attempted, but without apparent success. Newly instituted education in water conservation in the primary schools may have more effect.

An Apathetic Public

Public disinterest in water waste appears to be partly due to the special nature of the local water systems. All rural areas, and even the villages and smaller communities, are served by mains bearing public taps ("standpipes") to which all inhabitants come for water. Piped water in houses is rare outside the strictly urban regions. Control of waste at public taps is difficult if not impossible. One never takes a trip in the country without seeing a few taps leaking badly or left open. Consequently, the city user, with water piped into his place of residence or business, can see no reason for bearing the cost of metering, or the onus of conservation, when his rural brother does what he likes without reprisal.

The outstanding exception to the general rule of apathy to water waste is Antigua, the driest of the islands. At the height of an extreme drought several years ago, potable water is reputed to have sold for as much as \$1 (BWI) a gallon. Such severe conditions developed a public intolerance for water waste, and even the public taps are now metered.

Impoundment and Turbidity

Trinidad, with plenty of rainfall in its mountainous areas, has the problem of making suitable impoundments in very rugged terrain. When impounded, water in the zone of stagnation becomes foul because of the constant warm weather. Although there are no overturns due to fluctuations in temperature, a sudden heavy rainfall may roll over the water in the reservoir by driving a wedge of cool water under the bottom layer. Reservoirs are usually equipped with drainage gates at very low levels so that

the foul bottom water can be drawn off when heavy rain is expected. Wells in the central part of the island are high in iron and require deferrization, but conventional methods are adequate.

Georgetown, British Guiana, located in an extremely water-rich area, treats a unique type of water in its filtration plant. Entering the plant with a pH value in the low 5's and color ranging above 400 units, this "black" water from the Lamaha Canal is converted into a water of normal pH value, with color not greater than 15 or 20 units. This is accomplished by liberal doses of alum and sodium aluminate (about 1 ton of alum per day for 5 m.g.d., and about one-third as much aluminate), and two stages of sedimentation. It is undoubtedly the only waterworks in the world in which manatees are deliberately placed in its open secondary sedimentation tanks to keep down growth of vegetation.

Other areas encounter problems of very high turbidities. Kingston, Jamaica, treats turbidities, which may run occasionally as high as 5,000 units, in a conventional rapid sand filtration plant, with air-scour equipped filters. Alum doses run as high as $3\frac{1}{2}$ grains per gallon. It also treats similar waters in an old but handsome slow sand filter plant by means of primary settling tanks that could well serve as yacht basins.

On Other Islands

The small, dry island of Antigua is a waterworks man's nightmare and a geologist's paradise. The northern section of this 12- by 15-mile island is limestone, yielding a niggardly quantity of very hard water. The central section is marine chert, yielding water of such high salinity as to be useless. The southern section, which is volcanic and mountainous, receives most of the small, poorly distributed rainfall and is used as the main impoundment area. Turbidities are very high, and there are no adequate filtration plants. Wells and infiltration galleries are also used in this area. It is one of the few places where a comprehensive plan for developing water resources exists, but the question of financing the plan remains unanswered.

For more than 300 years, Barbados has been emptying its wastes into one set of holes in its coralline base and drawing its water from another set. No major outbreaks of waterborne disease have been recorded, and the island is rather proud of the quality of its water. However, both the rate of draft of water and the rate at which wastes are disposed of in the so-called "suck-wells" are increasing rapidly. No one knows how long such practices can safely continue. Fortunately, the health authorities are aware of the problem and are maintaining a close watch.

Each of the other islands has its own prob-

lems of water quantity and quality and engineering difficulties in bringing water to the point of use. Heads of several hundred or a thousand feet, which have to be eliminated at pressure-break tanks along the pipelines, are commonplace.

A full presentation of the many water problems of each island is impossible in this brief report, but enough has been said to indicate that the problems of quantity and quality of water in this attractive part of the world vary fully as much as they do in continental United States, except for the difficulties associated with cold weather.

The International Health Year

Plans for an International Health Year have gained momentum with a resolution adopted by the Executive Board of the World Health Organization asking the WHO Director-General to present specific projects for the Year to the World Health Assembly in May 1959. The resolution, taken in January 1959, favored emphasis on national undertakings to be coordinated on a regional and worldwide basis.

The action followed a U.S. Senate resolution, passed in August 1958, proposing talks with other nations on the designation of an international health and medical research year, "or other methods of developing intensive international cooperation in the field of health."

In December 1958, the United Nations General Assembly also passed a resolution inviting the World Health Organization to consider organizing the Year primarily on a national basis. The purposes outlined were the spread of medical knowledge, furthering of joint scientific research, exchange of experience in the use of atomic energy in medicine, organization of mass health education on a broad scale, and provision of assistance to underdeveloped countries, including equipment, medicine, special literature, and specialists.

In anticipation that the Twelfth World Health Assembly will act favorably on the proposal, Surgeon General Leroy E. Burney has appointed an ad hoc committee to consider participation of the United States in the Year and to discuss the feasibility of establishing a national committee on the International Health and Medical Research Year. This group, which met on May 6, 1959, includes representatives of both governmental and private agencies in the health and medical fields.

A special medium extends the viability of organisms in swab specimens during prolonged transport time from the patient to Alberta's central public health laboratory, which serves an area of about 200,000 square miles.

Transport Medium for Specimens in Public Health Bacteriology

R. D. STUART, M.D., D.P.H.

DELAY during the transmission of specimens from source to laboratory most noticeably affects delicate organisms which survive poorly over a period of 24 to 48 hours. Such organisms are *Neisseria gonorrhoeae*, *Haemophilus pertussis*, and *Trichomonas vaginalis*, and also *Shigella* species when specimens are obtained on rectal swabs. The pyogenic cocci common in throat inflammation and superficial infection are usually more resistant but may be significantly affected if few in number or if transport time is prolonged. Such conditions can readily arise during epidemiological investigation carried out in remote areas.

The problem has been variously tackled in the past. Two major devices have been employed. First, cooling or freezing, which slows normal bacterial metabolism, has been used to extend viability and at the same time to diminish bacterial competition. Second, transport on culture media has been employed to increase viability by encouraging multipli-

cation, but this necessitates selective agents to limit bacterial competition. Both these methods have significant disadvantages. Methods of chilling or freezing are troublesome in initial application and add considerable additional weight and cost during transport. Methods of transport in selective culture media demand a medium appropriate to each bacterial pathogen and are limited by the availability of specific selective agents which will work equally well under a variety of environmental influences and over a greatly variable time period. Such agents do not exist for most bacteria.

A transport medium must be simple in clinical use, easy in laboratory manipulation, cheap, and of wide applicability.

The transport medium to be described has all these virtues. Introduced by Stuart (1) primarily for the transport of swabs for gonococcal culture, it was applied by Moffett, Young, and Stuart (2) to the investigation of similar material from clinics mostly within 24-hour transport distance, and later by Stuart, Toshach, and Patsula (3) to the greater transport distances found in Alberta. Its value for this purpose has been confirmed by L. LeMinor, S. LeMinor, and Combes (4) from the Pasteur Institute, Paris, France; by Wilkinson (5), from the Whitechapel Clinic, London, England; by Alin (6), from the State Public Health Laboratory, Sweden; and by DeBoyn-ton (7), Los Angeles County Health Depart-

Dr. Stuart is director of the Provincial Laboratories, Alberta (Canada) Department of Health, and professor of bacteriology, University of Alberta, Edmonton. He presented this paper to the laboratory section of the 1958 combined meeting of the Canadian Public Health Association and the Western Branch of the American Public Health Association in Vancouver.

ment, Calif., but irregularities in performance have been detected by Cradock-Watson, Shooter, and Nicol (8).

Its coincidental value for the preservation of living trichomonads in similar material was emphasized by several of the above workers. Alexander (9), in Liverpool, England, emphasized its general value for gynecological specimens. The applicability of this transport medium to other bacteria was indicated first by Stuart (10), who dealt particularly with meningococci and *Shigella* species and gave some preliminary information on the satisfactory transmission of *H. pertussis* and other respiratory pathogens. Cooper (11), in Australia, produced ample evidence to indicate the value of this transport method for all respiratory and other pathogens examined, while Stokes (12) emphasized its value in the transmission of anaerobic bacteria to a central reference laboratory. Many public health laboratories across Canada now use the method routinely for all bacterial infections when specimens have to be transported over considerable distances.

Rationale of Method

The transport method is based on two main premises explained more extensively in earlier work. Briefly these are, first, that oxidation is an important cause of bacterial death during transport and, second, that elimination of all nutrients from a transport medium is the simplest way of maintaining the bacterial status quo in specimens. Thus bacteria, if kept alive by the elimination of oxygen, remain in the same relative proportions in which they existed

in the original material from the patient. The applicability of these premises to all bacteria also obviates the necessity for using different transport culture media to suit different bacteria and makes unnecessary the frequently hopeless search for suitably specific bacteriostatic agents to control unwanted bacterial multiplication during transport. Simplicity of clinical application insures that the method is highly acceptable to physicians.

The transport medium is a soft water-agar gel, hard enough to prevent agitation during transport but soft enough to avoid cracking when a swab is pushed into it. Sodium thioglycolate was selected experimentally as the best reducing agent, but is used as thioglycolic acid, chiefly because measuring is simpler than weighing. Conversion to the sodium salt is achieved by adding NaOH to the medium, the pH being stabilized by a phosphate buffer. Calcium, as calcium chloride, was found decidedly beneficial, but its presence necessitated the use of glycerophosphate as a buffer. Calcium glycerophosphate is soluble to about 2 percent, whereas calcium phosphate is almost completely insoluble. A reduction indicator is considered desirable and methylene blue was found decidedly better than resazurin. Acid production by swab sticks and swabs is of occasional detrimental significance, but is eliminated by boiling them in buffer solution before issue. Of major importance, however, is the impregnation of these swabs with charcoal, the rationale of which has been fully described (3). This charcoal impregnation neutralizes an incompletely identified inhibitor of bacterial viability, regularly present in variable

Table 1. Results of parallel smear and culture examinations for gonorrhea in females

Year	Number of specimens	Number of positives				Percent positive	
		Total positive	Culture positive, smear positive	Culture positive, smear negative	Culture negative, smear positive	By culture	By smear
1952	2,546	323	144	143	36	89	56
1953	2,945	331	130	151	50	85	54
1954	3,030	411	180	182	49	88	56
1955	3,243	492	204	238	50	90	52
1956	3,513	482	180	246	56	88	49
1957	5,042	705	204	452	49	93	36

Transport Medium

Dissolve 6 gm. Bacto agar in 1,000 ml. chlorine-free distilled water. At the same time to another 900 ml. distilled water, add 2 ml. thioglycolic acid (Difco), 12-15 ml. $\frac{N}{1}$ NaOH (to bring to approximately pH 7.2; the amount is selected according to local experience to avoid as far as possible any final pH adjustment), 100 ml. solution of sodium glycerophosphate (commercial, 20 percent w/v in water), and 20 ml. solution of CaCl_2 (1 percent w/v in water). Add this mixture to the original melted agar. Check pH and if necessary adjust to pH 7.3-7.4. Add 4 ml. methylene blue (0.1 percent in water). Mix well and dispense in $\frac{1}{4}$ -oz. screw-capped bottles, filling to capacity. Screw caps on securely, but not tightly. Sterilize in flowing steam, avoiding overcrowding, for 1 hour. Tighten caps immediately following sterilization. After cooling, the transport medium should be colorless.

NOTE: Distillate from chlorinated water occasionally contains significant amounts of free chlorine. This must be checked rigorously. We pass all distilled water through an ion-exchange resin column before use. This water is used for all the above preparation work.

Swabs

Prepare neat swabs with good quality absorbent cotton and applicator sticks. Prepared swabs are boiled in Sorensen's phosphate buffer solution ($\frac{M}{15}$) pH 7.4 (approximately 500 swabs standing in 100

ml. buffer in 1,000 ml. beaker, boiled 5 minutes). Remove, shake off excess moisture, then dip in a 1 percent suspension of finely powdered charcoal in water. We use activated charcoal (B.D.H.), but animal charcoal (Cenco), blood charcoal (B.D.H.) and Norit have been used successfully when powdered sufficiently fine. Swirl swabs around to coat thoroughly with charcoal (swabs should be quite black when wet). Shake off excess moisture, place in cotton-plugged tubes, dry in oven, and sterilize.

Instructions Sent With Outfits

Take the specimen and insert the swab or swabs into the upper third of the medium in the small bottle. Cut off the protruding portion of the swab stick with scissors and screw the lid on the bottle tightly. This usually forces the swab down slightly and centers it in the transport medium. Label the bottle and return it with the swabs enclosed to the laboratory as soon as possible. Keep specimens in refrigerator until ready for shipment.

The swabs are sterile. They have been treated with charcoal to improve the conditions for culture.

Laboratory Handling

Grasp the end of the short swab stick firmly with a long-shanked artery forceps and apply swab to culture media in the usual way. It is important that material from the swab itself is applied to the medium surface because adhering transport medium may be deposited on a culture plate and give a false impression of a satisfactory inoculum.

amount in all batches of agar so far examined. This inhibitor becomes of considerable significance because of the absence of protein nutrients in the transport medium.

A transport kit has been described by Stuart (10), and full instructions for its preparation and use are given above.

Application of Transport Method

Gonorrhea

Culture is essential in diagnosing gonorrhea only in females; thus consideration is restricted to cervical and urethral swabs from female pa-

tients. The two swabs from each patient are placed in the same transport bottle and are cultured together, generally on Peizer's medium prepared approximately as described by Trowbridge and McConkey (13) except that Difco supplement B is replaced by a locally prepared yeast extract. Colonies are identified when necessary by the oxidase reaction, and fermentation tests are carried out as a routine.

The relative inefficiency of smear examination is adequately demonstrated in table 1, but there has never been any suggestion from physicians that the combination of smear and culture failed to detect any suspected clinical case.

Table 2. Effect of transport time on culture results¹

Time, in hours	Number of positives				Percent positive by culture
	Total positive	Culture positive, smear positive	Culture positive, smear negative	Culture negative, smear positive	
Under 24-----	279	106	163	10	96.4
24-48-----	180	199	191	90	81.3
48-72-----	61	21	11	29	52.5
72-96-----	45	20	16	9	80.0
96 upward---	18	6	4	8	55.6

¹ All specimens received September 1953 through June 1955.

Indeed, recent work by Crookes and Stuart (14) shows that culture alone, aided by a selective agent to eliminate overgrowth of coliforms, can be depended on to identify practically all infections from patients under adequate clinical control.

The effect of transport time on culture results was assessed in earlier work (table 2), but the percentages have no absolute significance. The decided drop at the 48- to 72-hour period is apparently contradicted by the rise between 72 and 96 hours. The probable explanation of this peculiar finding is that a more interested and cooperative individual took most of the latter specimens. The figures, however, support the belief that culture is still very much worthwhile even after a swab has spent 4 days in transport medium, and these findings have now been considerably improved by a new culture technique (14).

Trichomoniasis

Investigation for the presence of *T. vaginalis* is carried out routinely on all specimens received for gonococcal culture and in addition on all vaginal swabs submitted for general or special investigation. After cultures have been prepared, a small amount of material from the swab is suspended in a drop of normal saline on a slide. A coverglass is applied and the preparation is viewed by reduced illumination or by dark field for active trichomonad flagellar movement. In an earlier series of 400

consecutive specimens examined in parallel by a careful staining technique and by the above method, all clinical infestations were detected by the latter. Table 3 shows the findings in our gonococcal culture section over the past 4 years.

Dysentery

The chief value of the transport medium is its applicability to rectal swabs. The value of rectal swabs in the diagnosis of dysentery has been emphasized by Cruickshank and Swyer (15), and by Yannet, Leibovitz, and Deutsch (16), though their general usefulness has been doubted by Thomas (17) and decried by Shaughnessy, Friewer, and Snyder (18) for enteric investigations. Most workers agree that the rectal swab to be satisfactory must be kept moist and brought to the laboratory within 6 hours or so. Yet, in a dysentery outbreak in an isolated community the doctor or public health worker, coming perhaps from some considerable distance, may with luck obtain a few specimens of feces but can never hope to investigate at all adequately the incidence or epidemiology of the disease unless he can take rectal swabs. These can readily be collected from a large number of people within a short time, but they can rarely be brought or sent to the laboratory in less than 24 hours.

Experimentally, the transport medium has regularly been found effective in maintaining viability of *Shigella* and *Salmonella* species on rectal swabs for more than 48 hours and has even been found superior to parallel feces specimens up to 4 days. The results of a recent field experience are shown in table 4. Insufficient parallel specimens were received for statistical analysis, but the physicians' increasing

Table 3. Identification of *Trichomonas vaginalis* from cervical and urethral swab specimens in transport medium

Year	Number of specimens	Number positive	Percent positive
1954-----	3,039	730	24
1955-----	3,243	675	21
1956-----	3,513	739	21
1957-----	5,042	1,559	31

Table 4. Field experience in Sonne dysentery outbreak ¹

Type of specimens	Number of specimens	Positive specimens	Percent positive
<i>Parallel specimens</i>			
Feces-----	19	11	58
RST-----	19	13	68
<i>Individual specimens</i>			
Cases and contacts:			
Feces-----	143	72	50
RST-----	99	65	66
Convalescents and carriers:			
Feces-----	34	2	6
RST-----	349	36	10

¹ Transport time averaged 2 days.

RST—rectal swab in transport medium.

enthusiasm for the transport rectal swab is revealed in its increased use for convalescents and carriers in the later stages of the outbreak.

During 1956 and 1957, 4,059 specimens were examined in the central provincial laboratory specifically for dysentery organisms. Of 3,469 feces, 100, or 2.9 percent, were positive; of 522 rectal swabs in transport medium, 32, or 6.1 percent, were positive, and of rectal swabs in ordinary tubes, 68 were all negative. (*Shigella sonnei* and *Shigella flexneri* were isolated in approximately equal numbers.) Such evidence suggests that rectal swabs in the transport medium are not inferior to specimens of feces for the isolation of *Shigella* species. Although the method has never been recommended for the investigation of *Salmonella* infections, the following strains were coincidentally isolated from these rectal swabs received in the transport medium; 1 *S. paratyphi* B, 7 *S. typhimurium*, and 1 *S. tennessee*. The effect of time of transport of rectal swabs under field conditions could be assessed in 228 instances when this time was known accurately. For 105 it was one day, and for 123, two or more days. The incidence of detection of *Shigella* was exactly 11 percent in each group.

Haemophilus Infections

Cooper (11) has shown experimentally that *Haemophilus influenzae* and *H. pertussis* re-

main alive in the Stuart swab kit for 28 days, but no figures are available from any large-scale field investigation. Dr. H. Robertson and Dr. H. O. Dillenberg, from the Provincial Public Health Laboratory in Saskatchewan, have provided me with their findings in a small outbreak of whooping cough. From 29 specimens received as swabs, cough plates, or serum slants, *H. pertussis* was isolated only once, whereas from 17 specimens received as swabs in the transport medium *H. pertussis* was isolated in 10 cases. Dillenberg also mentioned that he was able to culture *H. pertussis* from such swabs after holding periods of 3 and 4 days. *Haemophilus vaginalis*, recently described by Gardner and Dukes (19), also appears to be a difficult organism to investigate. Amies and Jones (20) in this laboratory have succeeded in isolating it from 19 out of 371 cervical swabs submitted in transport medium for routine gonococcal culture.

General Throat and Superficial Infections

The value of the described transport medium for throat pathogens has been more than adequately stressed by Cooper (11). In this laboratory over the last 2 or 3 years the transport medium has been recommended on various occasions to city and health unit medical officers. These occasions have generally concerned outbreaks of particular infections, such as diphtheria and beta hemolytic streptococcal disease, particularly when a considerable holding period was inevitable between the taking of the specimens and their delivery to the laboratory. In 1957 a total of 1,020 such specimens were received, and from these 230 *Streptococcus pyogenes*, 344 *Staphylococcus pyogenes*, and 23 *Diplococcus pneumoniae* were reported as probably significant pathogens. Nine of these pneumococci were isolated in pure culture from eye swabs, one after 4 days of transport time. This finding may indicate the value of the transport medium in such specimens from which significant growths are often difficult to obtain.

Whether or not the transport medium is advantageous in ordinary throat infections is debatable. Over the 4-month period January to April 1957, 1,180 throat swabs were received, as ordinary swabs and as swabs in transport

Table 2. Effect of transport time on culture results¹

Time, in hours	Number of positives				Percent positive by culture
	Total positive	Culture positive, smear positive	Culture positive, smear negative	Culture negative, smear positive	
Under 24----	279	106	163	10	96.4
24-48-----	480	199	191	90	81.3
48-72-----	61	21	11	29	52.5
72-96-----	45	20	16	9	80.0
96 upward---	18	6	4	8	55.6

¹ All specimens received September 1953 through June 1955.

Indeed, recent work by Crookes and Stuart (14) shows that culture alone, aided by a selective agent to eliminate overgrowth of coliforms, can be depended on to identify practically all infections from patients under adequate clinical control.

The effect of transport time on culture results was assessed in earlier work (table 2), but the percentages have no absolute significance. The decided drop at the 48- to 72-hour period is apparently contradicted by the rise between 72 and 96 hours. The probable explanation of this peculiar finding is that a more interested and cooperative individual took most of the latter specimens. The figures, however, support the belief that culture is still very much worthwhile even after a swab has spent 4 days in transport medium, and these findings have now been considerably improved by a new culture technique (14).

Trichomoniasis

Investigation for the presence of *T. vaginalis* is carried out routinely on all specimens received for gonococcal culture and in addition on all vaginal swabs submitted for general or special investigation. After cultures have been prepared, a small amount of material from the swab is suspended in a drop of normal saline on a slide. A coverglass is applied and the preparation is viewed by reduced illumination or by dark field for active trichomonad flagellar movement. In an earlier series of 400

consecutive specimens examined in parallel by a careful staining technique and by the above method, all clinical infestations were detected by the latter. Table 3 shows the findings in our gonococcal culture section over the past 4 years.

Dysentery

The chief value of the transport medium is its applicability to rectal swabs. The value of rectal swabs in the diagnosis of dysentery has been emphasized by Cruickshank and Swyer (15), and by Yannet, Leibovitz, and Deutsch (16), though their general usefulness has been doubted by Thomas (17) and decried by Shaughnessy, Friewer, and Snyder (18) for enteric investigations. Most workers agree that the rectal swab to be satisfactory must be kept moist and brought to the laboratory within 6 hours or so. Yet, in a dysentery outbreak in an isolated community the doctor or public health worker, coming perhaps from some considerable distance, may with luck obtain a few specimens of feces but can never hope to investigate at all adequately the incidence or epidemiology of the disease unless he can take rectal swabs. These can readily be collected from a large number of people within a short time, but they can rarely be brought or sent to the laboratory in less than 24 hours.

Experimentally, the transport medium has regularly been found effective in maintaining viability of *Shigella* and *Salmonella* species on rectal swabs for more than 48 hours and has even been found superior to parallel feces specimens up to 4 days. The results of a recent field experience are shown in table 4. Insufficient parallel specimens were received for statistical analysis, but the physicians' increasing

Table 3. Identification of *Trichomonas vaginalis* from cervical and urethral swab specimens in transport medium

Year	Number of specimens	Number positive	Percent positive
1954-----	3,039	730	24
1955-----	3,243	675	21
1956-----	3,513	739	21
1957-----	5,042	1,559	31

Table 4. Field experience in Sonne dysentery outbreak¹

Type of specimens	Number of specimens	Positive specimens	Percent positive
<i>Parallel specimens</i>			
Feces-----	19	11	58
RST-----	19	13	68
<i>Individual specimens</i>			
Cases and contacts:			
Feces-----	143	72	50
RST-----	99	65	66
Convalescents and carriers:			
Feces-----	34	2	6
RST-----	349	36	10

¹ Transport time averaged 2 days.

RST—rectal swab in transport medium.

enthusiasm for the transport rectal swab is revealed in its increased use for convalescents and carriers in the later stages of the outbreak.

During 1956 and 1957, 4,059 specimens were examined in the central provincial laboratory specifically for dysentery organisms. Of 3,469 feces, 100, or 2.9 percent, were positive; of 522 rectal swabs in transport medium, 32, or 6.1 percent, were positive, and of rectal swabs in ordinary tubes, 68 were all negative. (*Shigella sonnei* and *Shigella flexneri* were isolated in approximately equal numbers.) Such evidence suggests that rectal swabs in the transport medium are not inferior to specimens of feces for the isolation of *Shigella* species. Although the method has never been recommended for the investigation of *Salmonella* infections, the following strains were coincidentally isolated from these rectal swabs received in the transport medium; 1 *S. paratyphi* B, 7 *S. typhimurium*, and 1 *S. tennessee*. The effect of time of transport of rectal swabs under field conditions could be assessed in 228 instances when this time was known accurately. For 105 it was one day, and for 123, two or more days. The incidence of detection of *Shigella* was exactly 11 percent in each group.

Haemophilus Infections

Cooper (11) has shown experimentally that *Haemophilus influenzae* and *H. pertussis* re-

main alive in the Stuart swab kit for 28 days, but no figures are available from any large-scale field investigation. Dr. H. Robertson and Dr. H. O. Dillenberg, from the Provincial Public Health Laboratory in Saskatchewan, have provided me with their findings in a small outbreak of whooping cough. From 29 specimens received as swabs, cough plates, or serum slants, *H. pertussis* was isolated only once, whereas from 17 specimens received as swabs in the transport medium *H. pertussis* was isolated in 10 cases. Dillenberg also mentioned that he was able to culture *H. pertussis* from such swabs after holding periods of 3 and 4 days. *Haemophilus vaginalis*, recently described by Gardner and Dukes (19), also appears to be a difficult organism to investigate. Amies and Jones (20) in this laboratory have succeeded in isolating it from 19 out of 371 cervical swabs submitted in transport medium for routine gonococcal culture.

General Throat and Superficial Infections

The value of the described transport medium for throat pathogens has been more than adequately stressed by Cooper (11). In this laboratory over the last 2 or 3 years the transport medium has been recommended on various occasions to city and health unit medical officers. These occasions have generally concerned outbreaks of particular infections, such as diphtheria and beta hemolytic streptococcal disease, particularly when a considerable holding period was inevitable between the taking of the specimens and their delivery to the laboratory. In 1957 a total of 1,020 such specimens were received, and from these 230 *Streptococcus pyogenes*, 344 *Staphylococcus pyogenes*, and 23 *Diplococcus pneumoniae* were reported as probably significant pathogens. Nine of these pneumococci were isolated in pure culture from eye swabs, one after 4 days of transport time. This finding may indicate the value of the transport medium in such specimens from which significant growths are often difficult to obtain.

Whether or not the transport medium is advantageous in ordinary throat infections is debatable. Over the 4-month period January to April 1957, 1,180 throat swabs were received, as ordinary swabs and as swabs in transport

medium, from out-of-town areas at transport distances of 1 to 4 days; 640 swabs were received in transport medium and 540 as ordinary swabs. The area distribution of these specimens was approximately equivalent. *Streptococcus pyogenes* was isolated from 19 percent of the ordinary swabs and from 25 percent of the transport medium swabs. This difference is of doubtful significance, but it might be considered in relation to a parallel observation that the percentage of isolations of streptococci from throat swabs in transport medium remained constant regardless of whether the specimens had been in transit 1, 2, 3, or more days, whereas there appeared to be a considerable drop in the recovery of such organisms from ordinary swabs more than 2 days old.

Because of the enthusiasm of clinical workers for the transport medium, however, it became necessary to minimize these differences in order to protect the laboratory from an inordinate amount of medium making and to restrict the use of transport outfits to health officers in distant areas or under special circumstances. Since the medium and transport outfit are now commercially available, this attitude may have to be revised.

Disadvantages of the Transport Medium

A little extra care must be used by technicians in extracting the swab from the transport jelly, and a trivial delay is imposed during inoculation of culture media by the manipulation of the short swab. Of more significance is the occasional apparent multiplication of gram-negative bacilli on transport swabs even in the absence of recognized nutrients in the transport medium. This is suggested by the finding of heavy growths of coliform bacilli (mainly *Escherichia* and *Aerobacter* species) from about 5 percent of throat swabs in transport media compared with about 1 percent from ordinary swabs. If coliforms in large numbers can interfere with the isolation of hemolytic streptococci they may be even more troublesome with gonococci, especially because they are likely to be more common on swabs from the genitalia. This supposition, raised only after the recent observations on throat swabs, has been supported by a study of laboratory rec-

ords. Of 100 consecutive culture "failures" over several years, at least 50 were associated with heavy growths of coliform bacilli.

Such observations led to the search for a selective agent which would specifically inhibit coliform bacilli while allowing the growth of all desired pathogens. This agent was particularly difficult to find in connection with *Neisseria*. Search for an agent suitable for incorporation into transport media was soon abandoned. Standardization of the time of exposure is essential to the use of any bacteriostatic agent, and transport time of specimens is completely uncontrollable. In culture plates, however, aerosporin (A) (polymyxin B sulfate) has been found to have in low concentrations a regular and specific differential activity between coliforms and pathogenic *Neisseria*, inhibiting the former and leaving the latter unaffected. The beneficial effect on the culture of gonococci achieved by adding sterile aerosporin solution to a final concentration of 1 microgram (10 units) per milliliter in Peizer's medium has been described (14), but this technique cannot easily be applied to the isolation of other bacteria. Blood agar plates are generally used for this purpose. The preparation of special batches of this routine medium with aerosporin incorporated would be impracticable in most laboratories because of its irregular use, and parallel cultures on routine and aerosporin media would be expensive and tedious.

Surface impregnation of one-half of a blood agar plate with a few drops of a 25-microgram (250 units) per milliliter of aerosporin solution, prepared by appropriate dilution in water

Table 5. Application of aerosporin technique to selected throat swabs in 89 specimens¹

Organisms	Routine ²	Aerosporin ³
Coliforms-----	29	4 11
<i>Protus</i> -----	2	1
<i>Streptococcus pyogenes</i> -----	4	7
<i>Staphylococcus pyogenes</i> -----	11	25
<i>Pneumococcus</i> -----	2	5

¹ Transport time averaged 2 days.

² One-half ordinary blood agar plate.

³ One-half same blood agar plate after surface application of 250 units/ml. of aerosporin.

⁴ Distinctly inhibited in 6 specimens.

of the sterile powder provided for intramuscular use, is a simple and effective compromise. This is done prior to inoculation, which is carried out as soon as the plate has dried. Table 5 shows the results from 89 throat swabs, known or suspected to contain coliform bacilli, cultured on such media. Each swab was spread uniformly over the culture plate, one-half of which was the aerosporin test, the other half the routine control.

This technique has not been adopted fully into routine use, chiefly because it is only occasionally necessary. The incidence of coliform bacilli is rarely high enough to cause significant trouble, but whenever necessity has arisen the technique has proved satisfactory. All common respiratory pathogens except *Haemophilus* strains can be effectively isolated by this special technique. *Haemophilus* strains, of course, can still be recovered from the untreated portion of the plate in the usual manner.

Summary

Laboratory experience over a number of years in the use of a non-nutrient transport or holding medium for bacteriological swabs has been described. The method is simple in clinical use, easy in laboratory manipulation, cheap, and of wide applicability. Its greatest value is in the transport of delicate organisms such as *Neisseria*, *Trichomonas*, and probably *Haemophilus pertussis*, and of *Shigella* species on rectal swabs when such specimens are desirable or necessary. It has a further application certainly in the transmission of eye swabs and under special circumstances in the investigation of throat and superficial infections.

The most delicate bacteria appear to survive uniformly over a 24-hour transport period and with considerable regularity up to 48 hours. Even up to 4 days transport time, swab specimens for the diagnosis of gonorrhea in females yield more positives by culture than do corresponding smears by microscopy. Sturdier bacteria survive better.

In general the absence of nutrients from the transport medium insures that the bacterial status quo of specimens is well preserved, but very occasionally coliform bacilli appear able

to multiply even in this environment. Whenever this is likely to be a nuisance it can be counteracted easily after the transport swab reaches the laboratory by the use of aerosporin (polymyxin B sulfate) in culture media, either by incorporation or by surface application.

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SUPPLY REFERENCE

- (A) Sterile Intramuscular Powder, manufactured by Burroughs, Wellcome and Co.

Study of Back Supports for Premature Infants

The effect on premature infants of a diaper-roll support to the lower back has been the subject of a research study conducted jointly by the Division of Nursing Resources, Public Health Service, and Bellevue Hospital, New York City. Data were collected at Bellevue from April to November 1958.

Round-the-clock observations of the behavior of 30 premature infants receiving routine care and a like number supported by diaper rolls have indicated thus far that the use of the roll does not result in weight gain of the prematures but may contribute to the well-being of the infants by increasing sleeping time and reducing crying. Analysis of the data, now underway, may produce new knowledge on premature infant behavior for nurses, physicians, and social scientists.

The idea for the diaper roll was conceived by Eileen Hasselmeyer, R.N., M.S., nurse consultant with the division, who was chief investigator of the study. She had noticed, several years ago, that premature infants pushed, wriggled, or squirmed until they achieved a position giving support to the lower back.

Miss Hasselmeyer has been awarded a National League for Nursing fellowship for 2 years of study toward a doctorate in the nurse education department of New York University.

Radiation Control Activities in a Local Health Department

M. R. ZAVON, M.D.

C. A. WILZBACH, M.D.

WHAT can be done to control ionizing radiation in this day of increasing awareness of its hazards? More specifically, what can be done by a local health department already burdened with all the work it can handle and besieged by cries on every side for funds for additional programs?

The Cincinnati Board of Health has met this question with a series of activities aimed at reduction of exposure to radiation. The program thus far, only a bare beginning, has been conducted with a minimum in budget, personnel, and equipment, but we believe it has proved worthwhile.

Accidental Contamination Incidents

In Cincinnati in 1952 a radium capsule, used for instrument calibration, fractured in the ordinary course of operation. By the time the situation became fully understood an entire three-story building had become contaminated, and the 220-odd employees had to be examined for possible radiation exposure. With the exception of contamination of the building there were no serious effects from this accident, but it did serve to alert the health department to the need for greater awareness of the presence and potential hazard of sources of ionizing radiation.

A fire in this same building a year later raised the specter of danger to firemen fighting the fire. As a result, with the help of the Atomic Energy Commission and the cooperation of the Public Health Service, a course on radiation for firefighters was held in Cincinnati in 1953.

In 1954 a quarter curie of polonium was spilled at a local industrial plant, and the health department assisted in the cleanup operation. Occasional calls for assistance in monitoring X-ray installations were answered, but no regular program was developed.

Development of a Program

In 1955 it became evident that an organized program of radiation control was needed. A physician with previous experience in radiation protection work, who had been hired part time as director of occupational health services, commenced the radiation control program with minimum equipment.

Two steps were taken initially. One, the State health department was asked to forward copies of radionuclide authorization reports from AEC. Two, a survey was begun of shoe-fitting fluoroscopes in use in the shoe stores of the city. Each shoe fluoroscope was inspected, and a form containing some 35 items completed. The owner was advised verbally and in writing of any glaring defects, and at the conclusion of the survey the findings were presented to the Cincinnati Board of Health. The survey, conducted by one man who had other responsibilities as well, took approximately 1½ years. In all, 34 machines were surveyed.

Dr. Zavon is director of occupational health services, Cincinnati Health Department, and assistant professor of industrial medicine at the Kettering Laboratory of the University of Cincinnati. Dr. Wilzbach is health commissioner of Cincinnati.

"Radiological Health Practice" (24 pages, self-cover, 65¢ per copy) has been prepared and published by the Program Area Committee on Radiological Health, American Public Health Association. Complimentary copies are being distributed to State health officers and State sanitary engineers.

From the experience in this survey we concluded that the cost of inspecting these machines routinely would be prohibitive. In addition, putting what amounted to a health department seal of approval on shoe-fitting fluoroscopes seemed a dubious practice in the face of the unnecessary radiation exposure that they represent. At two meetings with the shoe dealers we discussed the situation. Shortly thereafter the shoe dealers requested the board of health to ban the use of these machines. The board did so by passing a regulation having the standing of a city ordinance or a State law.

At this point we decided that the radiation program would benefit from outside assistance and support. Consequently, the board of health appointed a Radiation Advisory Committee, consisting of technically qualified persons from industry, labor, medicine, dentistry, and public health. The health commissioner, the director of occupational health services, and the chief of the bureau of air pollution control are ex officio members. From the committee has come advice as to procedure and priorities.

About the same time that the advisory committee was formed another major step in the control program was initiated. Working with and through the Cincinnati Dental Society, the city undertook to alert the local dental profession to the need to reduce radiation exposure for themselves and their patients to the minimum consistent with diagnostic needs. A talk to the dental society was followed by a short article in its journal. This in turn was followed by an offer to arrange for proper coning and filtration for all dental X-ray machines. Approximately 50 percent of the membership of the dental society accepted the offer.

Arrangements were made with the two largest local dental suppliers to install aluminum filters on any dental machine for a fixed maximum fee or to furnish the necessary filters to

the dentist for him to install. The added filtration was to bring the total to the 1.5 mm. recommended in the National Bureau of Standards Handbook 60 (1955).

At this writing the installation of filters is nearing completion. When it is finished, the city will arrange through the dental society for a film badge service for those dentists who wish it. Use of a film badge for 13 weeks should enable us to gain some idea of the radiation exposure of the dentist and his assistants. If indicated, office surveys and corrective action can then be undertaken.

We are now facing the question of requiring registration of all radiation sources in order to determine their location. Already working closely with the fire department, the health agency has organized a list of known radionuclide users and has advised on procedures for handling fires where radiation may be a factor. The fire department in turn has held short courses for its personnel. Other city departments and other members of the board of health are cooperating in the further development of a radiation control program. The program will be integrated into our regular operating programs insofar as possible, and regular personnel will be trained to do a continuing job.

Additional activities will be necessary in the development of a well-rounded program, but there are limitations imposed by political boundaries which can be overcome only if State authorities take action. The bureau of air pollution control in the Cincinnati Department of Public Safety has long conducted routine air monitoring for radiation, but the confines of a city are too narrow for effective control of radiation in air or water. Nevertheless, we believe that municipal departments with responsibility for air and water must be as aware of radiation sources as they would be of any other contaminant.

Cincinnati's program in radiation control, by using existing facilities and cooperating agencies wherever possible, has developed and grown without significant additional expenditures. We believe that much can be done by cities of our size, 500,000, and smaller ones, to limit or reduce exposure to radiation with available facilities and staff.

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, at press conference on
March 16, 1959*

Public Exposure to Radiation

DURING the past 2 weeks there has been, as you know, considerable public discussion about radioactivity and the effect upon health caused by the presence of radioactive elements in wheat, milk, water, and other foods.

Some of the discussion has resulted from the release by the Public Health Service of its reports on radioactivity in milk.

I think it is desirable to emphasize several points:

1. Radiation is not new in our environment, but the problems of radiation in the nuclear age are obviously growing and will be with us from now on. These problems cannot—and should not—be minimized.

2. There are many sources and kinds of radiation, such as cosmic rays and medical X-rays, some of which contribute more than fall-out to the total radiation to which the population is exposed.

3. Many scientists are seriously concerned with the cumulative effects on human beings of repeated small exposures of radiation, and research is being done by the Public Health Service, the Atomic Energy Commission, and others to ascertain these effects. We are developing plans to enable the Food and Drug Administration to engage in research in this area.

4. Our scientific information at this time is not sufficient to evaluate precisely the long-term health effects of the small amounts of radioactivity now contained in water, air, milk, and other foodstuffs. Continuing and expanding efforts will be made to put ourselves in a position to make precise evaluations.

5. The Public Health Service has repeatedly emphasized that the amount of radioactivity

found in milk is well within the tolerable limits as established by the National Committee on Radiation Protection and Measurement. These limits are the only benchmarks now available.

6. Some of the figures in the milk studies have been misunderstood and need further explanation.

7. The Public Health Service has proposed a further major step-up in its expanding radiological health activities.

Both the Public Health Service and the Food and Drug Administration of this Department have responsibilities in this area. It is apparent that the activities carried on in connection with these responsibilities will need to be substantially strengthened in order to deal with the health problems which radiation increasingly presents.

With respect to the hazards of radiation, we should remember that according to present theory any radiation may be hazardous to health. The degree of hazard may be great or negligible depending on many factors—strength, duration of the exposure, the part of the body exposed, previous exposure, and so on.

Surgeon General Burney advises me that some of the harmful effects that can result from radiation, and about which there is concern, are genetic mutations, the shortening of the lifespan, and increased incidence of certain types of cancer, including leukemia.

The Atomic Energy Commission has been conducting studies on a broad basis for 5 years, including studies of radioactive elements in water, air, and soil as well as human bone and some foodstuffs. Studies which have been un-

dertaken more recently by the Public Health Service supplement some of the studies by the Atomic Energy Commission.

With respect to the Public Health Service's milk sampling study and the reports on it, we need to take into account a number of factors.

Milk was chosen for our initial study among the foods for several reasons. One of the radioactive isotopes of most concern is strontium-90, because this element has a much longer life than most isotopes, because in the biochemical processes of the body some strontium-90 is deposited in the bones, and because strontium-90 is present in milk. Since milk and milk products properly represent such a large part of our national diet, it is likely that a sizable proportion of the strontium-90 that stays in the body comes from milk and its products.

In addition, of course, milk is produced in all parts of the country all year and is thus readily available for uniform scientific study.

As published reports of the Atomic Energy Commission, Public Health Service, and other studies show, strontium-90 and other radioactive elements are also present in wheat, soybeans, water, air, grass, and in the soil itself.

With respect to possible misunderstandings about the figures contained in the Public Health Service monthly reports on radioactivity in milk, it is important to remember that they should be considered in relation to other figures. The National Committee on Radiation Protection and Measurement, on the basis of the scientific opinion available to it, has set maximum permissible limits for lifetime exposure of the individual to specific radiation and radioactive materials.

These limits were adapted from safety standards for persons working in close proximity to sources of radiation, such as medical X-ray technicians. The occupational permissible limits were divided by 10 to provide permissible limits for the general population.

For strontium-90, for instance, the committee's current recommendation for a maximum permissible concentration is 80 micromicrocuries per liter of water or milk. This means that on the basis of present knowledge the average concentration of strontium-90 among all items of the diet—water, meats, vegetables, bread, and so on—could be 80 micromicrocuries per

liter (or per kilogram—2.2 pounds) for a lifetime without exceeding the current maximum permissible concentration.

(A curie is the amount of radioactivity in 1 gram of radium. A micromicrocurie is one millionth of a millionth of a curie.)

Average yearly levels of radioactivity in milk are far more significant than monthly levels because the yearly averages are more accurately comparable with lifetime permissible limits. For strontium-90, for example, there was an increase in St. Louis, Mo., from 12.2 micromicrocuries in October 1958 to 20.1 in November 1958 (which then dropped back to 15.6 in December). The average level for the year ended October 1958 was 11.4 compared with 12.5 as the average level of the year ended November 1958. This yearly average is to be compared with the 80 micromicrocuries per liter currently used as the lifetime permissible concentration.

I am advised—and it should be emphasized—that these so-called permissible limits are only calculated estimates. They will be subject to change as more and better scientific data are developed about radioactive elements and their effect on the human body.

For example, there has already been some public discussion related to lowering the recommended levels for some elements, such as strontium-90. Further consideration should be given to the amount of strontium-90 which is distributed and retained in the body. A great deal more research is needed to provide data for a more accurate correlation between the amounts found in foodstuffs and their lodgment in the body.

For the time being the current maximum permissible limits represent the most informed scientific opinion available to us.

However, when the total amount of radiation to which people are exposed is increased, measures should be taken to reduce radiation over which we have some control. This led the Public Health Service to advocate several years ago the abolition of X-ray machines used in some stores for fitting shoes, and a year ago the substitution of skin tests for mass X-ray surveys as the first step in detecting tuberculosis.

Last September I discussed at a press con-

ference the range of activities conducted by the Department in the field of radiation.

We are now working with the Food and Drug Administration to determine what can be done to enlarge its capabilities for carrying out its statutory responsibilities as they relate to the field of radiation.

With respect to the Public Health Service program, the Department's budget for 1960 calls for slightly more than a doubling of the capabilities of the Public Health Service in the field of radiation. The request is for an appropriation of \$1,439,100, an increase of \$805,000 and the largest single increase in the Public Health Service. This is in addition to about \$2 million being devoted to the study of radiation by the National Institutes of Health through grants-in-aid and in its own laboratories. The expanded Public Health Service effort would be made in three categories—research, technical assistance to States and communities, and training of personnel.

Dr. Burney advises me that this research will have as its aim the development of better knowledge concerning the effects of radiation on the human body. To obtain more knowledge in this aspect of the problem, studies will be made in two types of population groups—individuals exposed to radiation in industry and individuals exposed in the course of medical diagnosis and therapy.

In addition, the research would seek to simplify and standardize tests used to measure those radiation levels which affect people. With such standardized methods, a national

system could be devised, with the help of State and Territorial public health agencies, for analyzing and exchanging information on radiation.

Technical assistance to the States and communities would include the assignment of trained Public Health Service personnel to selected State, local, and regional offices. It would also include a survey to identify and assess nationwide radiological health resources. One aspect of this survey would be to identify personnel who might be most readily trained for work in radiological health.

The training activity would cover expansion of the existing number of professionally trained persons responsible for direction of national and State program activities in radiological health. The experience gained in these training activities would be applied to the training programs conducted by State and local health agencies. I feel that these steps are essential in the fiscal year 1960, and that if taken they can provide fruitful results on which to build additional knowledge and measures for health protection against radiation.

It is quite clear that the problem of radiation in our environment is one we must learn to live with. In fact, it has always been with us. It has national and international implications of a most complex nature. As I have indicated, we need, as a first objective, to learn much more than we know now about the whole subject. Our objective in this Department is to aid in this effort in every way possible.

Human Genetics Research Training

A 5-year program to train research scientists in human genetics will begin September 1959 at the University of Pittsburgh Graduate School of Public Health. The university has received a \$16,000 grant from the Public Health Service for the first year.

Designed for students of biology with a master's degree, the course covers the hereditary aspects of various diseases, particularly those important to public health. The plan of study will be tailored to the background and research interest of the individual student. Dr. Ching Chun Li, associate professor of biostatistics and president-elect of the Society of Human Genetics, will direct the training.

dertaken more recently by the Public Health Service supplement some of the studies by the Atomic Energy Commission.

With respect to the Public Health Service's milk sampling study and the reports on it, we need to take into account a number of factors.

Milk was chosen for our initial study among the foods for several reasons. One of the radioactive isotopes of most concern is strontium-90, because this element has a much longer life than most isotopes, because in the biochemical processes of the body some strontium-90 is deposited in the bones, and because strontium-90 is present in milk. Since milk and milk products properly represent such a large part of our national diet, it is likely that a sizable proportion of the strontium-90 that stays in the body comes from milk and its products.

In addition, of course, milk is produced in all parts of the country all year and is thus readily available for uniform scientific study.

As published reports of the Atomic Energy Commission, Public Health Service, and other studies show, strontium-90 and other radioactive elements are also present in wheat, soybeans, water, air, grass, and in the soil itself.

With respect to possible misunderstandings about the figures contained in the Public Health Service monthly reports on radioactivity in milk, it is important to remember that they should be considered in relation to other figures. The National Committee on Radiation Protection and Measurement, on the basis of the scientific opinion available to it, has set maximum permissible limits for lifetime exposure of the individual to specific radiation and radioactive materials.

These limits were adapted from safety standards for persons working in close proximity to sources of radiation, such as medical X-ray technicians. The occupational permissible limits were divided by 10 to provide permissible limits for the general population.

For strontium-90, for instance, the committee's current recommendation for a maximum permissible concentration is 80 micromicrocuries per liter of water or milk. This means that on the basis of present knowledge the average concentration of strontium-90 among all items of the diet—water, meats, vegetables, bread, and so on—could be 80 micromicrocuries per

liter (or per kilogram—2.2 pounds) for a lifetime without exceeding the current maximum permissible concentration.

(A curie is the amount of radioactivity in 1 gram of radium. A micromicrocurie is one millionth of a millionth of a curie.)

Average yearly levels of radioactivity in milk are far more significant than monthly levels because the yearly averages are more accurately comparable with lifetime permissible limits. For strontium-90, for example, there was an increase in St. Louis, Mo., from 12.2 micromicrocuries in October 1958 to 20.1 in November 1958 (which then dropped back to 15.6 in December). The average level for the year ended October 1958 was 11.4 compared with 12.5 as the average level of the year ended November 1958. This yearly average is to be compared with the 80 micromicrocuries per liter currently used as the lifetime permissible concentration.

I am advised—and it should be emphasized—that these so-called permissible limits are only calculated estimates. They will be subject to change as more and better scientific data are developed about radioactive elements and their effect on the human body.

For example, there has already been some public discussion related to lowering the recommended levels for some elements, such as strontium-90. Further consideration should be given to the amount of strontium-90 which is distributed and retained in the body. A great deal more research is needed to provide data for a more accurate correlation between the amounts found in foodstuffs and their lodgment in the body.

For the time being the current maximum permissible limits represent the most informed scientific opinion available to us.

However, when the total amount of radiation to which people are exposed is increased, measures should be taken to reduce radiation over which we have some control. This led the Public Health Service to advocate several years ago the abolition of X-ray machines used in some stores for fitting shoes, and a year ago the substitution of skin tests for mass X-ray surveys as the first step in detecting tuberculosis.

Last September I discussed at a press con-

under 18. Included were 1,338 children, of whom 568 were under the age of 6, and 770 between 6 and 17.

Coverage

These children do not represent a complete count of the blind children in the State. At least two sources of children known to be blind were not included. A private nursery for blind children in southern California reported that it had 18 children enrolled, and 52 others on its "cradle roll," but refused to permit its medical records to be used for the study. Consideration was given to the inclusion of children in Sonoma, Porterville, and Pacific State Hospitals, and estimates received from the superintendents of these institutions indicate that there are approximately 160 blind children in residence. These were not included partly because it was felt that the primary handicap was not blindness, and also it would have been difficult to obtain complete diagnostic information on a case-by-case basis.

That there may be as many as 200 blind children in the State who are not enrolled in school or known to agencies offering services to preschool blind children was suggested by a review of the records in the department of education. In addition to the 110 children about whom there had been correspondence in 1955 or 1956, there were 229 last discussed in correspondence dated 1954 or earlier. It is difficult to believe that many of these children have died or moved from California. There was evidence that cerebral palsy or mental retardation was present in a fairly high proportion of these cases, and it is possible that some are receiving care in institutions for these conditions. It seems likely that a substantial number of blind children are being cared for at home or in regular schools, without benefit of the specialized training required if they are to become self-sufficient adults.

Even with the exclusions mentioned above, the number of children included in the survey yields rates of blindness considerably higher than those found by previous studies (1, 2). Because of the method used, these rates may be considered to represent minimum estimates of the number of blind children in California.

At least 33 children in every 100,000 were blind, with the rate among preschool children as high as 46 in those 4 years of age (table 1).

The high rates among children 2, 3, and 4 years of age were due to the prevalence of retrolental fibroplasia in that age group. Fortunately, it was discovered that this condition was caused by the use of excessive oxygen for newborn premature infants (3). The establishment of control measures for the administration of oxygen (4) has reduced drastically the incidence of this condition in the 3 years since this survey was made. Recent checks with the two agencies in California concerned with preschool blind children (5) revealed that they were serving 23 children with retrolental fibroplasia who were born in 1955, 9 born in 1956, 1 born in 1957, and so far none born in 1958. It is to be noted that children with retrolental fibroplasia born in the peak years 1951-53 are now reaching school age. Unless their increased number is offset by decreases in blind-

Table 1. Number of blind children covered in survey, with rates per 100,000 children, by age, California, 1956

Age, in years ¹	Total number in survey	Rate per 100,000 children ²
Total.....	1, 338	33
Under 1.....	28	(³)
1.....	76	(³)
2.....	132	43
3.....	125	43
4.....	126	46
5.....	81	30
6.....	105	38
7.....	97	35
8.....	85	30
9.....	75	30
10.....	74	35
11.....	67	32
12.....	66	32
13.....	48	25
14.....	43	26
15.....	38	24
16.....	37	24
17.....	28	⁴ 18
Not known (but school age).....	7	-----

¹ As of Dec. 31, 1955.

² Based on population estimates of the California State Department of Finance.

³ Rate not computed because coverage of very young children is obviously less complete than for other ages.

⁴ Coverage of 17-year-olds is probably less complete than for younger school-age children because many at this age have left school.

A survey of blind children in California provides basic information for planning programs of prevention.

Blindness in California Children

NEDRA B. BELLOC, M.A., PHYLLIS H. MATTSON, M.S., and
WILLIAM D. SIMMONS, M.P.H.

MAJOR causes of blindness in each age group must be fully explored before preventive efforts can be productive. Planning special educational services for blind children requires a knowledge of the numbers of such children in the population.

In 1954, a prevention of blindness project was undertaken by the California State Department of Public Health. The need to determine the causes of blindness in children and to obtain information on their number and age distribution resulted in this study, done in 1956.

Previous surveys of blind children made by the National Society for the Prevention of Blindness (1, 2) have been limited necessarily to reports from a few cooperating agencies in each participating State. In an effort to make this survey as comprehensive as possible, the prevention of blindness project undertook to gather data about all of the blind and partially sighted children known to school districts with special classes, the State school for the blind, the Variety Club's Blind Babies' Foundation,

The authors, at the time of the survey, were associated with the prevention of blindness project, a special assignment in the division of preventive medical services, California State Department of Public Health in Berkeley. Mrs. Belloc and Mrs. Mattson were respectively associate statistician and junior public health analyst. Mr. Simmons was supervisor. The project was financed by a grant from the W. K. Kellogg Foundation.

and the California State Department of Education.

The staff of the project visited each of the 29 school districts with special classes, transcribing from the medical records data on visual acuity, pathology, etiology, other handicapping conditions, and prognosis, as well as age and sex of each child. Teachers and coordinators were asked whether they knew of other blind children who were not enrolled in the special classes. Such children were included if medical records were available which enabled an assessment of their difficulty either in terms of visual acuity or diagnosis. The Blind Babies' Foundation, a voluntary agency which provides a home counseling and teaching service, supplied similar information for children currently on its rolls. The department of education made available its file on children about whom teachers or parents had inquired. These records were used only if there had been communication about the child during 1955 or 1956 (the 15 months preceding the survey), and sufficient information had been given to establish either or both the visual acuity and diagnosis. Records duplicated from more than one source were eliminated.

Although information was gathered on more than 600 partially sighted children, this report is limited to blind children (those with visual acuity of 20/200 or less in the better eye with maximum correction). Similarly, while records were obtained on a few children over 18 years of age, this report deals only with those

under 18. Included were 1,338 children, of whom 568 were under the age of 6, and 770 between 6 and 17.

Coverage

These children do not represent a complete count of the blind children in the State. At least two sources of children known to be blind were not included. A private nursery for blind children in southern California reported that it had 18 children enrolled, and 52 others on its "cradle roll," but refused to permit its medical records to be used for the study. Consideration was given to the inclusion of children in Sonoma, Porterville, and Pacific State Hospitals, and estimates received from the superintendents of these institutions indicate that there are approximately 160 blind children in residence. These were not included partly because it was felt that the primary handicap was not blindness, and also it would have been difficult to obtain complete diagnostic information on a case-by-case basis.

That there may be as many as 200 blind children in the State who are not enrolled in school or known to agencies offering services to preschool blind children was suggested by a review of the records in the department of education. In addition to the 110 children about whom there had been correspondence in 1955 or 1956, there were 229 last discussed in correspondence dated 1954 or earlier. It is difficult to believe that many of these children have died or moved from California. There was evidence that cerebral palsy or mental retardation was present in a fairly high proportion of these cases, and it is possible that some are receiving care in institutions for these conditions. It seems likely that a substantial number of blind children are being cared for at home or in regular schools, without benefit of the specialized training required if they are to become self-sufficient adults.

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¹ As of Dec. 31, 1955.

² Based on population estimates of the California State Department of Finance.

³ Rate not computed because coverage of very young children is obviously less complete than for other ages.

⁴ Coverage of 17-year-olds is probably less complete than for younger school-age children because many at this age have left school.

Table 2. School status of 1,338 blind children, California, 1956

School status	Total	Ages 5 years and under	Ages 6-17 years	Percent of those 6-17 years
Total.....	1, 338	568	770	100. 0
Regular class.....	75	8	67	8. 7
Special program ¹	233	34	199	25. 8
Sightsaving class ²	277	4	273	35. 5
School for the blind.....	145	5	140	18. 2
Other ³	94	77	17	2. 2
Not in school.....	445	419	26	3. 4
Unknown.....	69	21	48	6. 2

¹ Regular classes with supplementary work in Braille.

² Special classes using large-print textbooks.

³ Includes nursery schools, tutors, and so forth.

ness due to other causes in the younger ages, we can expect during the next 10 or 12 years, as they move through the school grades, to deal with problems of education for a greatly increased number of blind children.

It is not surprising that most of the children were of school age and attending classes, since the records used in the study were obtained primarily from schools (table 2). The largest group of children (35 percent) were enrolled in so-called sightsaving classes, in which large-print materials are used. Another 25 percent were enrolled in regular classes with work in Braille given by a special teacher. Eighteen

Table 3. Other handicapping conditions in 1,338 blind children, California, 1956

Principal other handicapping condition	Number	Percent of total
Total.....	1, 338	100. 0
Not specified.....	683	51. 0
None.....	426	31. 8
Total known to have one or more handicapping conditions.....	229	17. 1
Mental retardation.....	57	4. 3
Severe mental retardation.....	22	1. 6
Cerebral palsy.....	45	3. 4
Epilepsy.....	9	. 7
Hard of hearing.....	10	. 7
Deafness.....	8	. 6
Speech defect.....	6	. 4
Diabetes.....	1	. 1
Other ¹	71	5. 3

¹ Includes congenital heart conditions, cleft palate, loss or malformation of arm or leg, developmental retardation, and emotional disturbances.

percent attended the resident school for blind children in Berkeley.

Diagnostic information was taken from forms which differed in the various agencies. Many of them did not provide specifically for a description of other handicapping conditions. More than one-half of the records had no information about such conditions. It is therefore probable that the figures shown in table 3 represent an understatement of the number of these conditions present in conjunction with visual impairment. Severe conditions, however, such as mental retardation or cerebral palsy, would be likely to be mentioned if present, and were indicated in almost 10 percent of the records. Seventeen percent of all the children surveyed were known to have one or more handicapping conditions other than blindness.

Causes of Blindness

The diagnostic information given on the medical records was coded according to the Standard Classification of Causes of Blindness recommended by the Committee on Statistics of the Blind, 1956 revision. Since many records showed multiple pathologies, it was necessary to adopt certain arbitrary rules for selecting the one to be coded. Congenital malformations were given preference over infectious conditions, and these in turn were coded before refractive errors or muscular difficulties. Optic nerve atrophy was not coded unless it appeared to be primary. Retrolental fibroplasia was coded as primary regardless of associated or complicating conditions. Nystagmus was coded only if it appeared alone. The etiology was coded with an abbreviation of the standard classification, since the number of cases did not warrant a finer breakdown.

The sites and types of affections of eye conditions are shown in table 4. Since retrolental fibroplasia caused a large proportion of blindness in the younger ages, this table divides the children into groups 5 years of age and younger and 6 to 17 years of age. Nearly three-fourths of the former group were affected by retrolental fibroplasia. Structural anomalies accounted for more than one-quarter of the conditions in the older age group. Retinal

Table 4. Site and type of affection of eye conditions of 1,338 blind children, California, 1956

Site and type of affection	Number			Percent		
	Total	Ages 5 years and under	Ages 6-17 years	Total	Ages 5 years and under	Ages 6-17 years
Total.....	1,338	568	770	100.0	100.0	100.0
Structural anomalies.....	249	39	210	18.6	6.9	27.3
Myopia.....	66	2	64	4.9	.4	8.3
Albinism.....	50	-----	50	3.7	-----	6.5
Megalophthalmos.....	46	12	34	3.4	2.1	4.4
Multiple.....	36	7	29	2.7	1.2	3.8
Other structural anomalies.....	51	18	33	3.8	3.2	4.3
Cornea.....	12	1	11	.9	.2	1.4
Lens.....	158	26	132	11.8	4.6	17.1
Cataracts.....	145	23	122	10.8	4.0	15.8
Other lenticular disorders.....	13	3	10	1.0	.5	1.3
Uveal tract.....	30	3	27	2.2	.5	3.5
Retina.....	622	438	194	47.2	77.1	25.2
Retrolental fibroplasia (including associated or complicating conditions).....	547	417	130	40.9	73.4	16.9
Retinal and/or macular defects or degeneration.....	29	3	26	2.2	.5	3.4
Other retinal disorders.....	56	18	38	4.2	3.2	4.9
Optic nerve, optic pathway, and cortical visual centers.....	104	28	76	7.8	4.9	9.9
Optic nerve atrophy.....	83	24	59	6.2	4.2	7.7
Other optic nerve disorders.....	21	4	17	1.6	.7	2.2
Other.....	92	10	82	6.9	1.8	10.6
Vitreous.....	6	1	5	.4	.2	.6
General degenerative changes.....	13	3	10	1.0	.5	1.3
Macular disorders.....						
Squint, strabismus, esophoria, esotropia.....	12	2	10	.9	.4	1.3
Nystagmus.....	38	3	35	2.8	.5	4.5
Other muscular disorders.....	1	1	-----	.1	.2	-----
Refractive errors.....	22	-----	22	1.6	-----	2.9
Site not specified.....	61	23	38	4.6	1.0	4.9

conditions, including retrolental fibroplasia, represented another 25 percent, and affections of the lens, primarily cataracts, totaled 17 percent.

Of more importance from the standpoint of preventive efforts are the causes of blindness shown in table 5. Administration of excessive oxygen was assumed to be the cause of retrolental fibroplasia in 547 children, or 41 percent of the total in all ages. Congenital conditions made up the next largest group, accounting for 14 percent of the preschool group and nearly half of those in the older age group. The etiology was unknown or unspecified in about 15 percent of the cases. It can be safely assumed that many of those for whom no etiology was given had conditions present at birth. If the number of blind children is to be substantially reduced, some way must be found to prevent occurrence of the conditions producing abnormalities in the newborn.

In most of the cases in this study, excluding

retrolental fibroplasia, the actual cause of the blindness was unknown. It was merely reported as present at birth. This is an area in which careful, definitive research in the causes of blindness should be undertaken. Infections of the mother in pregnancy were said to be responsible for a little more than 2 percent of the cases, while infections of the child accounted for 1 percent.

Injuries, other than birth injuries, were responsible for blindness in 28 children, or 2.1 percent of the total. Since these were presumably all preventable, they warrant attention out of proportion to the small number of cases. In nearly 40 percent of the accident cases, the agent was not specified. Of those in which this detail was given, 7 cases, or nearly 30 percent, were due to explosions. Of these, four were boys between the ages of 6 and 10 who were playing with dynamite caps. Falls, including being dropped in infancy, were responsible for 6 cases.

Table 5. Causes of blindness in 1,338 blind children, California, 1956

Cause of blindness	Number			Percent		
	Total	Ages 5 years and under	Ages 6-17 years	Total	Ages 5 years and under	Ages 6-17 years
Total.....	1, 338	568	770	100. 0	100. 0	100. 0
Prenatal infectious diseases.....	30	11	19	2. 2	1. 9	2. 5
Postnatal infectious diseases.....	13	2	11	1. 0	. 4	1. 4
Birth injury.....	11	3	8	. 8	. 5	1. 0
Other injury.....	28	3	25	2. 1	. 5	3. 2
Retrolental fibroplasia (excessive oxygen).....	547	417	130	40. 9	73. 4	16. 9
Neoplasms.....	38	15	23	2. 8	2. 6	3. 0
General diseases, not elsewhere classified.....	12	1	11	. 9	. 2	1. 4
Congenital conditions, not elsewhere classified.....	455	79	376	34. 0	13. 9	48. 8
Unknown or unspecified.....	204	37	167	15. 2	6. 5	21. 7

Tables 4 and 5 were tabulated for the condition in the better eye, which is consistent with the basis upon which the criterion for determination of blindness rests. It was recognized that this may have caused the loss for comparative purposes of a few serious conditions such as neoplasms, in favor of the affection of the better eye which might have a loss of vision due to myopia. A review of the records revealed that there were only 27 cases in which the coding for the two eyes would have been different. The net effect of changes in coding for these 27 cases would have been negligible. Adding the two neoplasms, for example, would have raised the percentage attributed to this cause from 2.8 to 3.0.

Summary

This study was undertaken to determine the causes of blindness among children in California and the number and age distribution of such children. Data were gathered from the medical records available in all school districts with special classes for blind and partially sighted children, the State school for the blind, the State department of education, and the Variety Club's Blind Babies' Foundation. While the coverage is not complete, it is believed that a very high proportion of the total number of blind children in the State is included.

The rate of blindness among children under the age of 18 was found to be 33 per 100,000 with the rate among preschool children as high

as 46 in those 4 years of age. The high rate in the latter group is due to the large number of children born in the years 1951-53 who were blinded by retrolental fibroplasia, a condition found to be due to the administration of excessive oxygen to newborns.

Congenital conditions, primarily of unknown origin, were found to be the cause of a large proportion of blindness in the two age groups studied. A substantial reduction in the number of blind children in future years can only be achieved through the determination of ways to prevent these conditions.

Accidents, which are responsible for a relatively small number of cases, are nonetheless important since it may be possible by the regulation of such hazards as dynamite caps to prevent some tragic cases of blindness in young children.

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Economic Poisons Control

CONTROL of economic poisons in manufacturing, agricultural use, the home, and food establishments was the subject of a symposium held during Pennsylvania's seventh annual health conference at University Park in August 1958.

In opening the discussion, Robert C. Stanfill of the Philadelphia District, U.S. Food and Drug Administration, restated today's general regulatory controls, emphasizing these points:

- The estimated death rate from all types of poisoning, solids and liquids, is one-third that of 50 years ago, but the total number of preventable deaths and injuries is still impressive. Negligence on the part of our citizens cannot be prevented solely by legislation.

- Drugs and disinfectants for man and animals are subject to the Federal Food, Drug, and Cosmetic Act of 1938 and its amendments. Under provisions of this act safe tolerances are set for residues of pesticides on crops.

- Pesticides and disinfectants for inanimate objects are controlled by the Insecticide, Fungicide, and Rodenticide Act of 1947.

- Twelve caustic and corrosive acids and alkalis in certain concentrations are designated in the Federal Caustic Poison Act of 1927. Some of these, especially lye which is still used in home laundries and in making soap at home, continue to take their toll of children.

- Many hazardous paints, cleaning compounds, solvents, and miscellaneous agents are not covered by these laws.

- Use of precautionary labels on the 12 household size caustic and corrosive items is required, but adequate labeling of many more items is not covered by law. The incidence of accidental injuries may be reduced by thus identifying composition, harmful potentials, directions for safe use, and methods of emergency treatment.

- Enforcement of the Federal Food, Drug, and Cosmetic Act of 1938 and the Federal Caustic Poison Act of 1927, as amended, is the responsibility of the U.S. Food and Drug Administration. The U.S. Department of Agriculture is responsible for enforcing the provisions of the Insecticide, Fungicide, and Rodenticide Act of 1947 and its amendments. Mailing of certain poisons is controlled by postal laws. Packing specifications and warning regulations on shipping containers of acids, cosmetics, and explosives, are controlled by the Interstate Commerce Commission.

Summaries of other contributions follow.

Manufacturing Hazards

The term "economic poisons" includes a wide variety of chemicals and chemical compounds which have been developed for use in controlling, destroying, or repelling harmful insects or rodents, and predatory animals or other forms of animal life. The term also includes chemical substances used to defoliate plants and hormone-like substances that regulate the growth of plants.

In the production of economic poisons, the manufacturer has responsibilities to his employees and to the community. Successful manufacture and marketing of a product highly toxic to humans requires an industrial medical and hygiene program that insures a healthful working environment for employees. Cyanides and organic phosphate insecticides are among those requiring rigorous safeguards.

The Cyanides

There is a long history of the use of cyanides as fumigants in the control of insects and rodents. Two forms of cyanides are processed at the Warners Plant of the American Cyanamid Company in rather large quantity. One is a solid form which contains approximately 42 percent $\text{Ca}(\text{CN})_2$. The other is commercially pure hydrogen cyanide.

Calcium cyanide, a solid, is milled into various sizes depending on the ultimate use of the product. On exposure to air, it liberates hydrocyanic acid gas. It is essential, therefore, that processing equipment be maintained dusttight; otherwise, dust leaks into the workroom atmosphere lead to hazardous conditions.

The mill employed generates air pressure in the conveyors, elevators, and bins, and it is necessary to remove this pressure. This is accomplished through the use of the exhaust ventilation system. No attempt, however, is made to actually maintain the conveying equipment under a negative pressure since this would increase cyanide losses from the product. This condition of atmospheric balance is assured by a manometer in the ventilating system which is readily adjusted with a slide gate.

The drumming of the milled material is done with the aid of local mechanical exhaust ventilation. This provides an effective dust control and it is possible for the men to fill the drums without resort to gas masks.

Hydrogen cyanide is generated as a gas in reactors and is then condensed to a liquid. It is handled as a liquid from that point. Brine-cooled vessels are used. Here again, the main objective is to prevent the escape of hydrogen cyanide vapor from the equipment into the workroom atmosphere.

Hydrogen cyanide is a lethal gas and pre-

cautions must be observed wherever it is handled. At room temperature, it is a liquid but will boil at 79° F. With such a low boiling point, it is quite volatile and its vapor can penetrate all crevices and spaces to bring about the complete fumigation of the area being treated. Hydrogen cyanide gas is not irritating and, therefore, to the uninformed the potentially hazardous nature of an exposure may not be immediately apparent. This is true because the gas can be tolerated at concentrations that are dangerous. The gas is easily recognized by its odor which is like that of bitter almonds. The effect of HCN, in either gas or liquid form, is that of a chemical asphyxiant.

Hydrogen cyanide produces its toxic action with extreme rapidity. It is thought that hydrogen cyanide inactivates certain enzymes that catalyze oxidative processes in the tissues. Asphyxia at cellular level results from the arrest of the oxidative process. It is, in effect, a protoplasmic poison.

The essential health hazard in its processing is from inhalation. Absorption through the lungs is rapid. It can also be absorbed through the skin. If the skin is broken, or irritated, absorption is more rapid. The American Conference of Governmental Industrial Hygienists has established a maximum allowable concentration of 10 parts of hydrogen cyanide per million parts of air for daily exposures of 8 hours.

The symptoms following exposure to small quantities are headache, giddiness, fatigue, loss of appetite, and nausea. Rapid and complete recovery takes place upon removal from these small exposures. With greater exposure, additional symptoms may occur: sense of suffocation, vertigo, cyanosis, coma, convulsions, and death.

The greatest potential for escape of gas in our manufacture occurs from the reactors and from sampling points. Exhaust ventilation is employed rather extensively at the packings around the agitator bearings and at the sampling points, the entire system being connected to a water spray scrubber which prevents the discharge of hydrogen cyanide to the outdoors. The water is returned to the process to reclaim the cyanide collected.

The crude hydrogen cyanide is distilled and

stabilized, whereupon it is ready for packaging in compressed gas cylinders or as cyanide impregnated woodpulp disks. As a liquid, the material is handled quite safely although it is essential to maintain continued vigilance and care. Even small drops spilled on the floor can serve as a source of exposure to operators. These must be avoided.

Because hydrogen cyanide cannot be permanently stabilized, it is important that all cylinders be returned to the factory within 6 months of the filling date. This is necessary even though none of the hydrogen cyanide in the cylinder has been used. If allowed to stay in the cylinders indefinitely, the product may decompose. The accompanying heat and pressure may be sufficient to cause the cylinder to explode with possible loss of life and property.

Parathion

A major development in the growing list of economic poisons has been the manufacture of organic phosphate insecticides. One of the more toxic of the organic phosphates is parathion.

Parathion, when absorbed into the body, causes an inhibition of the enzyme cholinesterase and thereby allows the accumulation of large amounts of acetylcholine. As the cholinesterase levels are reduced, grave signs and symptoms may appear. These do not develop until the cholinesterase activity has been reduced to about 50 to 25 percent of normal. However, symptoms can also occur with a much smaller depression, provided it is rapid. The symptoms include headache, blurred vision, weakness, nausea, abdominal cramps, diarrhea, and tightness in the chest. The signs may include sweating, miosis, tearing, pulmonary edema, cyanosis, convulsions, coma, loss of reflexes, and respiratory muscle paralysis. Atropine, in excess of amounts conventionally employed, oxygen, and artificial respiration are used in the treatment of parathion poisoning. Lacking such treatment, death may result. The development of sensitive laboratory tests for the determination of cholinesterase levels in the blood has been most helpful in maintaining a continuous knowledge of the degree of exposure created by manufacturing operations. It is reported that new antidotes are

being developed for poisoning from this substance and they may offer improved treatment.

We have encountered little difficulty in the manufacture of parathion as a result of vapor exposures from the product. The most serious exposure hazard is the possibility of liquid parathion being absorbed through the skin. This exposure may occur from a small spill which may not be noticed immediately, since technical parathion is not a primary irritant. It is necessary to insist that operators take a complete shower at the end of each workday. Freshly laundered, complete work-clothing outfits are supplied the men daily by the company. Separate lockers are provided for street clothing and work clothing. Eating in the workroom is prohibited, and a separate lunchroom, removed from the operating area, is maintained.

The same emphasis on mechanical exhaust ventilation is given in the manufacture of parathion as in the cyanides. There is little danger of significant vapor exposure since the vapor pressure of parathion is relatively low at ambient temperature.

Medical control is maintained through periodic blood testing to determine cholinesterase levels of the employees, in addition to the mechanical aids to prevent exposure.

Maintenance workers must be safeguarded. Used piping and drums must be decontaminated. The prevention of exposure extends also to the control laboratory where a similar program of good industrial hygiene is maintained.

Employee Education and Department

All employees are thoroughly indoctrinated in the potential health hazards involved in processing economic poisons. This is done to establish a feeling of confidence so they will know how to act in any emergency.

Casual visits to these departments are not encouraged, even by employees of the plant.

The location of all persons in the department must be known at all times since, in an emergency, we want to be immediately assured they are safe. There is no time for delay in starting rescue efforts. A "buddy" system has been established, each employee being required to know the whereabouts of his partner at all times.

These precautionary methods have been very effective over the many years of manufacturing experience at our Warners Plant. On rare occasions, there have existed some temporary conditions of emergency but good deportment of the men on the job has prevented fatal accidents.

The attention given to conserving the health of men engaged in the manufacture of these economic poisons has been worthwhile. However, the manufacturer has a slight advantage in health conservation over the user. The manufacturer has a fixed installation, a group of trained chemical operators, and the availability of technical services. The user does not have a fixed installation in many cases and the training of his sprayers may be more on the basis of instilling fear rather than confidence.

In addition to technical services and literature offered by all manufacturers and the information contained on all of the warning labels of products, it is considered desirable that health agencies continue to direct their efforts toward good health practices in the manufacture and use of economic poisons.—JOSEPH F. MELLOR, JR., *industrial hygienist, Warners Plant, American Cyanamid Co., Linden, N.J.*

Food Establishment Use

Economic poisons most frequently used in food establishments are insecticides and rodenticides.

Many employ professional pest control operators experienced in the application of economic poisons and aware of the dangers from careless use of such poisons. On the other hand, proprietors of smaller food establishments may do their own pest control work.

If pest control efforts are confined to the use of registered insecticides and the instructions on the container are followed carefully, there will be little hazard of food contamination. A real danger exists, however, if insecticides and rodenticides not recommended for use in food establishments are purchased and applied in a careless manner.

As in the past, it is important to emphasize sanitation, screening, and ratproofing to re-

duce infestations by insects and rodents. Observance of such measures results in a minimum and more effective use of insecticides and rodenticides.

The use of economic poisons in food establishments has become more complex as many new pesticides have been developed. Formerly, pyrethrins, rotenone, organic thiocyanates, and sodium fluoride were the chief insecticides. Compounds of phosphorus, arsenic, thallium, and red squill were rodenticides commonly used. After World War II, many chlorinated hydrocarbon insecticides, some organic phosphate compounds, pyrethrum synergists, allethrin, and anticoagulant rodenticides appeared on the market.

These newer pesticides vary greatly in their toxicity to warmblooded animals, and some of the more toxic ones are not recommended for use in areas where food is prepared.

The importance of reading and following the directions on the labels of pesticides cannot be overemphasized. The consumer's ignorance on this subject was emphasized in a recent survey undertaken by the Chemical Specialties Manufacturers Association entitled "Do People Read Labels on Household Insecticides?" The survey showed that only between 8 and 15 percent of the people using these products were aware of the important precautions required for many years on all aerosol and liquid spray labels.

Hazards in the use of insecticides by inexperienced individuals are increased by ignorance of the cautions on labels.—ARNOLD MALIS, *Gulf Research and Development Co., Pittsburgh, Pa.*

Agricultural Residues

Our primary concern today is the unintentional chemical additives whose number is expanding at a rapid rate. Unintentional additives include pesticide residues, residues of antibiotics and hormones used for growth stimulation, traces of chemicals that cannot be avoided in good manufacturing practice, as well as residues of drug products resulting from the medication of animal feeds.

Of these, pesticide residues are the object of widespread attention. The modern history of pesticide residues began with the advent of DDT during World War II. Since then, a number of new organic materials, many of them quite specific, have been developed.

Pesticides, by definition, are those substances which prevent, destroy, repel, or mitigate insects, rodents, and other forms of undesirable plant or animal life. In actual practice, destruction is the most common method of control.

This killing is accomplished by substances poisonous to the particular form of life. Very often these substances are deleterious to higher forms of life, including man.

Resultant illnesses in man can be classified as either chronic or acute, depending on either a high or low level of toxic material and duration of exposure. For most substances, the effect of a high level of toxicity is well established, but there is great concern and a considerable lack of knowledge regarding the toxicology of low levels. There are many unanswered questions regarding the safety of small residues appearing in food.

As examples, lindane is not recommended for use on calves under 3 months of age, on milk cows, or on animals within 30 days of slaughter. It is used, however, in electric vaporizers for fly control in restaurants and considered safe insofar as the patron is concerned. What of the waitress or busboy who works in the dining room 8 or more hours a day? We can all recall pictures of Italian and North African children being dusted with DDT for typhus, yet recently several carloads of spinach were destroyed in Chicago because of an excessive DDT residue.

Probably the most important steps forward in controlling pesticides have been those resulting from the Miller Amendment to the Federal Food, Drug, and Cosmetic Act whereby approximately 100 chemicals have been cleared for food protection and more than 1,500 individual tolerances have been established on the basis of scientific data to permit these chemicals to be used effectively and safely for the benefit of farmers and consumers alike.

The number of chemicals and individual tolerances so identified increase with every re-

lease by the Food and Drug Administration. These tolerances are in the range of 0.1 to 14 ppm for the most part. One percent is the equivalent of 10,000 ppm so these tolerances are rather small. Certain chemicals are exempt from tolerances, and for a few a zero tolerance has been set, which means that they cannot be used under conditions leaving any toxic residue whatsoever.

A series of antibiotics and hormones have been developed that stimulate growth either by direct action on the animal or plant or by the repression of bacteria, parasites, or other organisms. A majority of animal feeds today contain penicillin, chlortetracycline, or tetracycline at a level of less than 50 grams per ton, and many feeds contain a considerably higher amount.

Use of an antibiotic on raw poultry up to 7 ppm is becoming almost routine in many large processing plants. Cooking effectively destroys this chemical additive. Hormones, such as diethylstilbestrol, are fed to many steers as a part of the daily ration, although in some cases ear implants are used to supply the hormone.

The liberal use of antibiotics in humans for minor conditions is thought by some to limit their effectiveness in a real emergency. How much of a buildup is obtained a few parts per million at a time from milk and from other sources is difficult to determine.

Residues resulting from the incorporation of drugs into animal feed, especially poultry feed, appear to present no acute problems.

It is evident that control of agricultural residues requires a combination of education and cooperation, with emphasis placed on the following points. The grower must follow directions for use in both the time and rate of application, discontinuing use prior to harvest as indicated. The processor must accept only those raw agricultural commodities that fall within specified tolerances, following good manufacturing practices to reduce the amount of residue. The meat producer must stop the use of medicated feeds prior to slaughter. The dairy farmer must discard milk immediately following mastitis treatment. The baker and ice cream manufacturer must use only acceptable stabi-

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Patients Served by a Mental Health Unit of a City Health Department

JACOB TUCKMAN, Ph.D., and MARTHA LAVELL, M.S.S.

THE RECOGNITION of the public health aspects of mental illness has led to the establishment of mental health units by an increasing number of public health departments. Such units perform many functions which vary in scope and emphasis with the needs of the community and the degree of public support. These functions may include planning and coordination of mental health services, consultation to public and private agencies, inservice training, mental health education, casefinding, surveys, research, and direct services to individuals with mental health problems. Such direct services are usually limited to children but may include adults and special groups such as alcoholics.

Little is known about the characteristics of patients who come to the attention of mental health units of public health departments. The purpose of this study, therefore, was to obtain certain information about individuals known to the division of mental health of the Philadelphia Department of Public Health during the period 1955-57, its first 3 years of operation. Although there are gaps in the data, such material may be useful to health departments contemplating the establishment of mental health units or to already established units as a basis for comparison.

The services provided by the division, available to anyone in the community, include diag-

nostic evaluation and psychiatric treatment of children, adolescents, and adults; and consultation, information, and referral services directly to the patient or to responsible relatives, interested individuals, or agencies acting on his behalf. In selected cases, psychiatric evaluation and treatment on a continuing basis are available to individuals in their own homes.

Patient Data

During the 3-year period the division served 1,734 persons. Information about these patients was obtained from the case record, frequently limited to pertinent material noted on a 5- by 8-inch card. Data about the characteristics of the patient had not been gathered routinely because contact with the patient or a responsible relative was for brief periods or was limited to telephone contacts or because of the pressures on an overburdened staff. The material collected from the records was coded and transferred to punched cards.

Of the 1,734 individuals studied, 39 percent were male and 61 percent female. A breakdown by race shows 37 percent were white, 22 percent nonwhite, and 41 percent whose race was not stated. Since the proportion of nonwhites in the Philadelphia population has been estimated to be 24 percent (1), it seems probable, considering the large number of those whose race was not stated, that nonwhites were over-represented in the patient population.

The number of patients served varied with place of residence. Using 1957 estimated population figures for Philadelphia (1), rates were calculated for the 10 health districts into which the city is divided. They varied from 19.2 to

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lizers and emulsifiers. The confectionary maker must use only Food and Drug Administration certified colors. The food industry in general must exercise self-discipline with regard to chemical additives and pesticide residues. And the consumer must insist on adequate labeling and become more label conscious.—DELMAR K. MYERS, *Pennsylvania State Department of Agriculture*.

Home Control Activities

Limitations to current preventive measures hamper the control of accidental poisonings in the home. Some of the limitations and their solutions are:

- The tendency to categorize such accidents into groups, such as occupational, motor vehicular, and home, is conducive to duplication and overlapping of effort. Coordination among official and unofficial organizations, permitting the breakdown of artificial groupings and a free flow of information, is a "must."

- A standardization of language in the total field rather than a special jargon for each grouping is needed.

- To depend entirely on mortality data is a mistake. Morbidity data must also be collected and taken into account.

- One of the first educational efforts should be directed to eliminating "luck" as a so-called "cause" of accidents. The definite sequence of events that ends in an accident should be emphasized, showing that the negation of one of the factors in a sequence will prevent or modify the seriousness of an accident.

To date, accident preventers have attempted to accomplish their job primarily through the use of mass educational techniques. Mass edu-

cation is valuable when used to create a philosophy or community awareness of the problem. It is my thought, however, that it does not cause many individuals to change their living habits or their environment. The most lasting and rewarding results will come through specific educational efforts, tailoring the message to meet the needs of small reference groups. Scheduling of periodic meetings of such small groups should be developed to revive and maintain the impact of accident prevention drives.

Historically, the control of poisonings in Pennsylvania received its initial impetus from the American Academy of Pediatrics which formed an accident prevention committee early in 1950, resolving to urge its affiliates to undertake accident prevention activities.

In 1956, the Pennsylvania Department of Health joined with the Pennsylvania Academy of Pediatrics in establishing poison treatment centers in the State's hospitals. An accident prevention unit was formed in the Philadelphia Department of Health the same year, instituting a poison information center for round-the-clock emergency service to the public. A follow-up procedure is based on home accidental poisoning cases reported to this center. A public health nurse visits the victim's home to investigate and report the cause of the accidental poisoning.

A morbidity reporting system based on hospital reports of treated accidental injuries will be put into operation shortly by the Pennsylvania Department of Health. A trained investigator will follow up these reports to explore the "how" and "why" of accidental injuries. Accidental poisonings are to be included.—DAN D. GOWINGS, M.P.H., *director, division of environmental safety, Pennsylvania Department of Health*.

Table 2. Percentage of patients served by the division of mental health, Philadelphia, 1955-57, according to referral source

Referral source	Under 18 years (N=256)	18-64 years (N=1,061)	65 years and over (N=398)	Total ¹ (N=1,734)
Medical facilities:				
Health department	43	7	5	12
General hospitals and clinics	8	11	8	10
Psychiatric hospitals and clinics	4	4	3	4
Out-of-State psychiatric hospitals	0	1	1	1
City and State agencies (excluding medical):				
Law enforcement agencies	14	6	5	7
Other city departments	7	10	13	10
	(2)	7	17	8
agencies	4	17	10	14
Schools	4	(2)	0	1
Self or family	10	18	12	15
Other interested persons:				
Friends, neighbors	2	5	7	5
Councilmen, politicians	(2)	1	2	2
Lawyers	(2)	2	2	2
Landlords	0	1	4	2
Miscellaneous	2	4	6	4
Not stated	(2)	5	4	4

¹ Includes 19 cases not classifiable by age.

² Less than 0.5 percent.

NOTE: $\chi^2=406.60$; $df=20$; $P<.001$ (for the χ^2 analysis, psychiatric hospitals and clinics were combined with out-of-State psychiatric hospitals; other interested persons were combined with schools).

unions, Federal agencies (Army recruiting station, Bureau of Old-Age and Survivors Insurance, Housing Redevelopment and Relocation), chamber of commerce, American Legion, and others.

Significant age differences were found with respect to referral source. Health department referrals accounted for 43 percent of those under 18 years compared with 7 percent of those between 18 and 64, and 5 percent of those 65 and older. These findings were not unexpected in view of recent program developments in the division focusing on preschool

children seen in child health conferences at local health centers. Referrals from law enforcement agencies also accounted for a higher proportion of those under 18 years than of those in the two categories of adults, probably because such agencies are more likely to use community resources for children and adolescents than for adult offenders. Persons 65 and older were more likely than the other age groups to be referred by State agencies other than hospitals (primarily the department of public assistance), and persons between 18 and 64 years were most likely to be referred by voluntary welfare agencies.

The difficulties for which help was sought covered a wide range. Among the children were some who were not developing normally or who presented other problems of management, others with difficulties in school adjustment, and still others who had had a brush with the law.

The adults presented psychiatric problems of varying degree. In some cases the psychiatric problem contributed to marital difficulties. Some patients exhibiting paranoid tendencies appeared periodically at the mayor's office of information and complaints, at the police department, and at other public and private agencies demanding restitution or protection. Other mentally ill persons created public health or fire hazards by throwing garbage out of windows or accumulating trash. Some created a public nuisance by quarreling with or taunting their neighbors. In some cases the mentally ill person constituted such a potential danger to himself or to others that it was necessary in the absence of a responsible relative or interested agency to petition the court for psychiatric examination.

Some patients were public assistance clients for whom the agency requested evaluation of mental competency because there was a question about their ability to handle funds. Many patients were older persons who presented a variety of problems involving an impairment of their ability to maintain themselves economically, psychologically, physically, and socially.

One small group of patients in the most urgent need of hospitalization had been placed in jail because of the shortage of hospital beds. This practice has been terminated through

160.5 per 100,000. Health districts with high rates tended to be areas with high mortality and delinquency rates, substandard housing, and low income. Three percent of the total group resided outside of Philadelphia.

Only a very small percentage of the patients (7 percent) were without a responsible relative. Almost three-quarters (72 percent) had one or more close relatives, but this did not always mean that the relatives were willing or able to assist them. In 21 percent of the cases no information was available regarding the existence of a relative.

The age distribution of the patients ranged from a few weeks to 96 years (table 1). Of the total group, 11 percent were under 15 years, 7 percent between 15 and 24, 23 percent between 25 and 44, 18 percent between 45 and 64, and 19 percent 65 years of age and over.

In 22 percent of the cases, the actual age of the patient was not stated, but it was possible to estimate from the case record the age of most of these patients: 4 percent were children, 73 percent were adults, and an additional 21 percent were known to be older adults. For purposes of analysis, these cases were combined with those with ages specified in the following manner: children without a specified age were considered to be under 18 years; adults were considered to fall within the 18- to 64-year age range; and older adults were considered to be 65 or older.

Such an age grouping seemed reasonable in view of the special problems of children and the aged, both of whom tend to be dependent upon others for their agency contacts. Com-

parisons with general population figures for Philadelphia showed that children were under-represented (15 percent in the patient population and 27 percent in the general population), adults were about equal (62 percent and 65 percent, respectively), and older adults were over-represented (23 percent and 8 percent, respectively).

There were significant differences between the sexes in the age distribution. The children included 10 percent of the females compared with 18 percent of the males; the older adults, 19 percent of the males compared with 26 percent of the females.

Sources of Referral

Patients were referred to the division through many different channels, representing 87 unduplicated types of referral source (table 2). Twenty-seven percent were referred by medical sources, such as various divisions of the health department, general hospitals and clinics, and psychiatric hospitals and clinics.

Nonmedical city and State agencies referred 25 percent: 10 percent from such sources as the mayor's office of information and complaints, department of public welfare, licenses and inspection, personnel department, commission on human relations; 7 percent from law enforcement agencies such as courts, district attorney's office, police department including the juvenile aid bureau, and prisons; and 8 percent from State agencies such as the department of public assistance, department of welfare (bureau of aging services, bureau of hospitals, and State council for the blind), bureau of rehabilitation, and the board of parole.

Fourteen percent were referred by voluntary agencies concerned with child care and protection, financial assistance including shelters, nursing services, employment, rehabilitation, legal aid, and services for special groups such as the blind, prisoners, and transients. In 15 percent of the cases, the patient was referred by himself or his family. Eleven percent were referred by various interested persons including friends, neighbors, politicians, councilmen, lawyers, and landlords. Four percent were referred by miscellaneous sources including private nursing homes, employers, churches, labor

Table 1. Age distribution of 1,734 patients served by the division of mental health, Philadelphia, 1955-57

Age group, in years	Per- cent	Age group, in years	Per- cent
Under 5.....	5	50-54.....	5
5-9.....	3	55-59.....	4
10-14.....	3	60-64.....	5
15-19.....	4	65-69.....	3
20-24.....	3	70-74.....	5
25-29.....	5	75-79.....	4
30-34.....	6	80-84.....	4
35-39.....	7	85 and over.....	3
40-44.....	5	Not stated.....	22
45-49.....	4		

in 18 percent from 1 to 5 months, and in 5 percent for 5 months or more. Persons receiving service for at least 5 months were more likely to be children.

Outcome of contact with the patient is shown in table 5. Thirty-three percent of the cases were closed after information had been given regarding psychiatric resources or procedures, or after a referral had been made to a specific community resource, contacted by the division for this purpose. Five percent of the patients were referred to ancillary resources such as nursing homes and family, employment, and group work agencies. Seven percent of the patients were advised that a community resource which had previously served them would be more helpful to them.

Sixteen percent of the cases were closed after service had been completed for the public or private agency currently active in the situation. Most of these cases involved consultation and advice in meeting the patient's psychiatric

Table 5. Percentage of patients served by the division of mental health, Philadelphia, 1955-57, according to outcome of contact

Outcome	Under 18 years (N=256)	18-64 years (N=1,061)	65 years and over (N=398)	Total ¹ (N=1,734)
Information given re psychiatric resources or procedures.....	10	17	20	16
Referred to psychiatric resources.....	19	17	15	17
Referred to ancillary resources.....	4	4	8	5
Encouraged to seek psychiatric help.....	2	10	5	8
Petitioned court for psychiatric examination.....	(²)	2	4	2
Patient or family refused help.....	27	12	7	13
Service completed for public or voluntary agency.....	16	16	15	16
Directed back to resource previously involved.....	5	7	9	7
No further contact required, other.....	12	14	17	14
Not stated.....	4	2	1	2

¹ Includes 19 cases not classifiable by age.

² Less than 0.5 percent.

NOTE: $\chi^2 = 119.32$; $df = 18$; $P < .001$.

problem, but in some cases a supplementary service was performed, such as a home visit to determine mental competency.

In 13 percent of the cases, the patient or family refused help; in another 8 percent, the patient or family or both, were encouraged to seek psychiatric help, but the record contained no information that they had done so. Two percent of the cases were closed after the division had petitioned the court for psychiatric examination. In 14 percent no further contact was required for various reasons; the patient had shown improvement through extended casework or through individual or group psychotherapy, had died, disappeared, been sent to jail, had broken contact, or did not present a psychiatric problem.

There were significant age differences with respect to outcome of contact. A higher proportion of children than adults or older adults refused help; while a higher proportion of both adult groups than children was given information about psychiatric resources and procedures.

Discussion

Although the 1,734 patients served by the division of mental health during the first 3 years of operation included persons of all ages, children were under-represented and older adults over-represented by comparison with general population figures. The reason for this fact was that much of the work of the division in its early years was necessarily devoted to meeting the needs of chronic patients, since facilities in the community for the care and treatment of the mentally ill were inadequate. With the development of new programs and increased facilities, however, there has been a reduction in the backlog of mentally ill persons with unmet needs, making possible a greater emphasis on preventive work with children.

It might be expected that the major channel of contact for patients would be through the private and public health and welfare organizations. However, more than 40 percent of the patients came to the division through other sources, and almost all of these were appropriate referrals. This suggests a considerable degree of sophistication on the part of lay per-

new program. A small number of patients had recently been discharged from a mental hospital and needed help with employment, housing, social contacts, or psychiatric care on an outpatient basis. In a few cases social history data were required by a State hospital to help in planning for the patient or determining whether the home was ready to receive him.

Contacts and Outcome

The type of contact with the patient is shown in table 3. In half the cases (48 percent) contact with the patient or on his behalf was by telephone or correspondence or both; such contacts included information, referral, and consultation services. These contacts were not necessarily of short duration, since extensive exploration was often necessary to locate the appropriate community resource. In 24 percent of the cases, patients were interviewed in the division's offices or in health centers, usually by a psychiatric social worker but also by a psychiatrist or psychologist. Office contacts demanded more intensive work in clarifying the problem and in helping the patient and family accept referral for psychiatric help.

In 21 percent of the cases, visits to the pa-

Table 3. Percentage of patients served by the division of mental health, Philadelphia, 1955-57, according to type of contact

Type of contact	Under 18 years (N=256)	18-64 years (N=1,061)	65 years and over (N=398)	Total ¹ (N=1,734)
Telephone contact or correspondence or both.....	53	46	48	48
Office interviews ²	20	28	15	24
Home visits:				
By psychiatric social worker.....	8	16	25	17
By psychiatrist.....	(³)	2	3	2
By both.....	(³)	2	3	2
Diagnostic testing or individual or group psychotherapy or both ⁴	11	1	(³)	2
Not stated.....	7	5	5	6

¹ Includes 19 cases in which age was not stated.

² May include telephone contacts or correspondence.

³ Less than 0.5 percent.

⁴ With or without home visits.

NOTE: $\chi^2=170.70$; $df=8$; $P<.001$.

Table 4. Percentage of patients served by the division of mental health, Philadelphia, 1955-57, according to length of contact

Length of contact (in days)	Under 18 years (N=256)	18-64 years (N=1,061)	65 years and over (N=398)	Total ¹ (N=1,734)
1.....	29	36	35	35
2-6.....	11	15	18	15
7-13.....	7	8	11	8
14-20.....	6	5	6	6
21-29.....	5	6	5	6
30-59.....	8	11	11	11
60-89.....	6	4	4	4
90-119.....	2	3	2	2
120-149.....	1	1	1	1
150 and more.....	12	4	3	5
Not stated.....	13	6	4	7

¹ Includes 19 cases not classifiable by age.

NOTE: $\chi^2=53.72$ (omitting contribution of not-stated cases); $df=20$; $P<.001$.

tient's home were necessary, usually by psychiatric social workers, but in some cases by a psychiatrist, whose medical opinion was required regarding the mental competency of the patient. In some cases it was necessary for both psychiatric social worker and psychiatrist to make the home visit. In 2 percent of the cases, contact included diagnostic psychological testing or individual or group psychotherapy, or both, with or without a home visit.

There were significant age differences in type of contact. Home visits were required most for older adults, less for younger adults, and least for children. By contrast, such services as diagnostic psychological testing and psychotherapy were limited almost entirely to children, reflecting program emphasis.

There were also significant differences between the sexes in type of contact. Twenty-four percent of the women compared with 15 percent of the men required home visits.

Length of contact with the patient varied from 1 day to more than 5 months (table 4). The 1-day contacts generally were limited to telephone calls or an office visit. The longest contacts were with patients requiring more extensive psychiatric casework assistance or psychotherapy on a continuing basis. In 50 percent of the cases, contact with the patient lasted less than 1 week. In 20 percent of the cases contact was maintained from 1 week to 29 days,

An annual report in a series begun by the Communicable Disease Center in 1955, summarizing the findings of its nationwide surveillance activities.

Arthropod-Borne Encephalitis in the United States, 1957

JACOB A. BRODY, M.D., and WALTER A. MURRAY, Jr., M.D.

ENCEPHALITIS virus activity decreased in 1957, according to reports from epidemiologists of 46 States to the Communicable Disease Center, Public Health Service. Eastern encephalitis (EE) epizootics occurred in the Gulf States and as far north as South Carolina, but only five confirmed human cases came to our attention: two in Florida and three in Louisiana (fig. 1). Minimal virus activity was recorded in New Jersey and Massachusetts.

Western encephalitis (WE) virus activity was prominent only in the Mountain States in 1957, with California and Texas registering few cases (fig. 1). The majority of the reported human cases were centered about a small outbreak in the Denver, Colo., area.

The major public health problem in 1957 among the arthropod-borne diseases in the United States continued to be St. Louis encephalitis (SLE), with the bulk of cases in

Texas and California (fig. 1). Florida registered its first proved case, the only geographic extension of the North American arthropod-borne encephalitides beyond previous historical limits (1). The sizable outbreak of SLE occurring in the lower Rio Grande Valley appears to be the only major concentration of human cases of encephalitis in 1957.

Data Collection

Since 1955 information has been collected from State and local health departments, medical and veterinary virus diagnostic laboratories, the Disease and Eradication Division of the U.S. Department of Agriculture, and other sources.

Most of the appraisal of the 1957 data was carried out by the epidemiologists, laboratory directors, and public health veterinarians in State health departments. The National Office of Vital Statistics of the Public Health Service gave statistical advice, and cooperation was afforded by virus laboratories of several academic institutions, the National Institutes of Health Rocky Mountain Laboratory at Hamilton, Mont., the Walter Reed Army Institute of Research, Washington, D.C., and the Fourth U.S. Army Medical Laboratory in Dallas, Tex. Continued mutual exchange of data in 1957 resulted in four concurrent seasonal reports

Dr. Murray serves as assistant chief of the Surveillance Section, and Dr. Brody as intelligence service officer assigned to that section in the Epidemiology Branch of the Communicable Disease Center, Public Health Service, Atlanta, Ga. Dr. Alan W. Donaldson, assistant chief of operations, and Dr. Mario Pizzi, chief of the Surveillance Section at the Center, aided in the compilation of the data; and Ida L. Sherman, of the Center's Statistics Section, gave statistical assistance.

sons and organizations in recognizing psychiatric problems.

The study presents useful information about some characteristics of patients served by a mental health unit. Unfortunately, there were gaps in data on race, religion, marital status, and occupation. Although more information was available for patients seen face-to-face than for those served by telephone or correspondence, the gaps in data on the former group were too great to permit statistical analysis. In-

formation on the factors previously mentioned and others such as income, amount of schooling, mobility, and previous psychiatric care is essential for a better understanding of the patient load, and for program planning and improvement of services.

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Career Opportunities

Columbia University and the Institute for Crippled and Disabled will conduct a work conference June 8-26, 1959, on the roles of medicine, counseling, psychology, and social work in a vocationally oriented rehabilitation center. The conference is supported by a grant from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. Enrollment is limited to professional workers in the field of rehabilitation.

Yale University Department of Public Health offers for the academic year 1959-60 a new program designed to prepare nurses for positions in supervision, education, and consultation in chronic illness nursing. Funds for the course were made available through the Connecticut State Department of Health by a graduate training grant from the National Heart Institute of the Public Health Service.

The program covers a minimum of one academic year for students with advanced experience and training and leads to the degree of master of public health with a major in chronic illness nursing. Admission requirements include a bachelor's degree, graduation from an approved school of nursing, and experience in public health or teaching.

The University of Minnesota School of Public Health offers the second annual workshop on air pollution July 6-17, 1959.

Designed for engineers, physicians, chemists, and sanitation personnel concerned with community air pollution from the educational, governmental, or industrial viewpoint, the course will consist of lectures, demonstrations, field trips, and the application of fundamental knowledge in solving the air pollution problem

of a community. Enrollment is limited to 25. Applications may be filed with the University's School of Public Health, 1325 Mayo Memorial Building, Minneapolis 14, Minn.

The University of Minnesota has also announced a summer continuation course of instruction in chronic diseases, July 27 through August 22, 1959. The course is presented with the cooperation of the schools of public health of the United States and the Conference of Chronic Disease Training Program Directors as a non-academic-credit program in chronic diseases on the graduate level for physicians in health agencies and research workers in the medical sciences.

Subject areas are epidemiological methods in noninfectious diseases, recent advances in experimental and clinical aspects of heart disease and cancer, and public health chronic disease control programs with emphasis on heart disease.

Further information may be obtained by writing to Dr. Leonard M. Schuman, Professor of Epidemiology, School of Public Health, at the university.

Teachers College, Columbia University, will hold a work conference on the sheltered workshop as a community resource in the vocational rehabilitation of mentally retarded adolescents and adults July 27 through August 14, 1959, under the sponsorship of the Association for the Help of Retarded Children, Inc.

Information may be obtained from Dr. Abraham Jacobs, Box 35, Department of Psychological Foundations and Services, Teachers College, Columbia University, New York 27, N.Y.

and an annual summary report, which form the basis of information for this presentation.

Eastern Encephalitis

Five confirmed human cases of eastern encephalitis paralleled the reported occurrence of cases in horses in both early seasonal occurrence and geographic distribution, with the exception of an unusually early onset (February) in one of the two cases in Florida (table 1). The Florida patients recovered with very severe sequelae, whereas two patients in Louisiana recovered completely, but a third in that State was the only death reported. A presumptive case of EE was reported from McCracken County, Ky., in an 8-year-old girl who recovered, with persistent hemiparesis.

Information from the southern States revealed a prolonged seasonal incidence among horses, confirmed cases occurring from May through September. The clinical course of the disease in affected horses was characteristically violent, terminating in death in 24 to 48 hours. In all, 28 virus isolations were made from horse brains submitted to four laboratories from five States (table 2).

Ecological studies in Baldwin County, Ala., yielded the only virus isolation from mosquitoes in 1957 (2). A small endemic focus was suggested by isolations of virus from a number of species of wild birds and mosquitoes over a period of several months.

In contrast with 1955 and 1956, EE in pheasants was rare. The disease was evident in one captive pheasant flock in southern New Jersey in late September. One virus isolation was made. Although no reported cases in horses and pheasants occurred in Massachusetts, evidence of minimum virus activity was indicated in study areas by virus isolations from one wild and two sentinel pheasants, and the presence of antibodies in immature chickens, turkeys, starlings, and swine. From this area, the first human biting record for *Culiseta melanura* in a natural setting was established in September 1957 (3).

Similar ecological studies were conducted in Florida, Georgia, and South Carolina. In Georgia and South Carolina, antibodies were demonstrated in wild birds and immature feral swine, although no virus was isolated from mosquitoes, small mammals, or fowl. Negative

Figure 1. Geographic distribution of the arthropod-borne encephalitides in man, horses, birds, and mosquitoes in the United States, 1957.

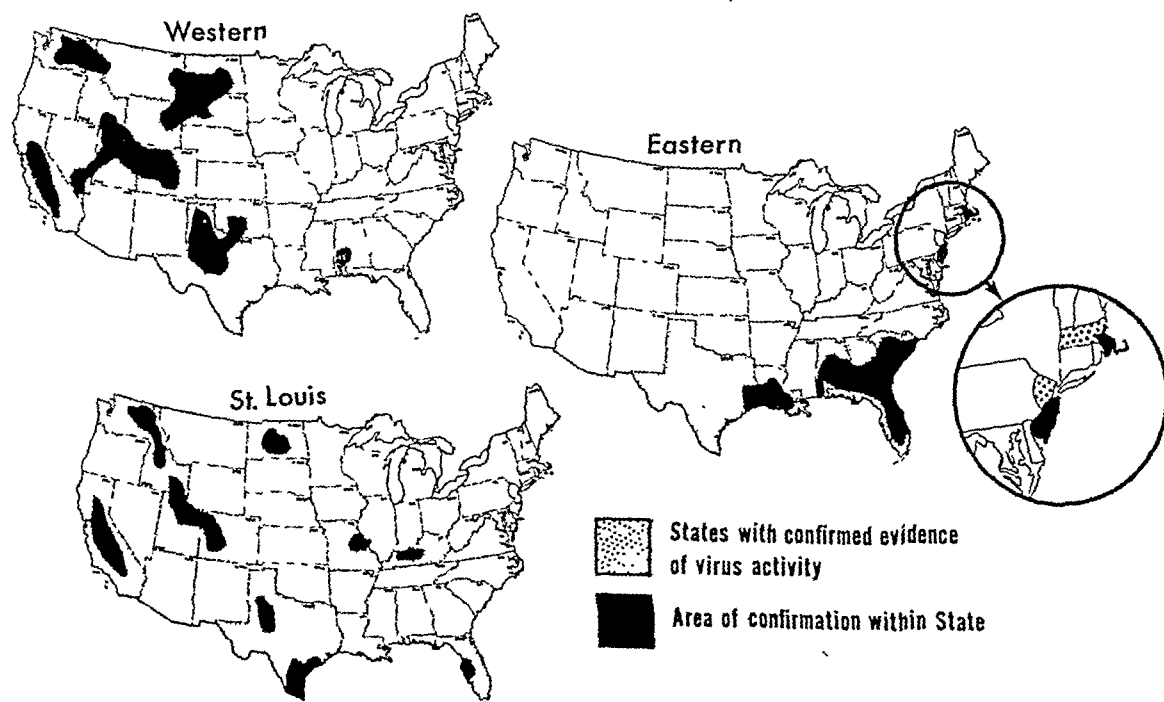


Table 1. Human cases of encephalitis, by State, in 1957

State	Report data ¹	Cases appraised as arthropod-borne encephalitis						Fatal cases
		EE		WE		SLE		
		Con- firmed	Pre- sump- tive	Con- firmed	Pre- sump- tive	Con- firmed	Pre- sump- tive	
Maine.....	8							
Massachusetts.....	23							
Rhode Island.....	13							
Connecticut.....	8							
New York.....	272							
New Jersey.....	24							
Pennsylvania.....	25							
Ohio.....	74							
Indiana.....	76							
Illinois.....	130							
Michigan.....	84							
Wisconsin.....	23							
Minnesota.....	2							
Iowa.....	13							
Missouri.....	15					1		
North Dakota.....	37			1				
South Dakota.....	5			1				
Nebraska.....	7							
Kansas.....	33				4		7	
Maryland.....	29							
District of Columbia.....	10							
Virginia.....	53							
West Virginia.....	5							
North Carolina.....	55							
South Carolina.....	15							
Georgia.....	17							
Florida.....	24	2				1		
Kentucky.....	50		1			4		
Tennessee.....	16							
Alabama.....	22							
Mississippi.....	25							
Arkansas.....	11							
Louisiana.....	4	3						
Oklahoma.....	23							
Texas.....	196			7		61	78	23
Montana.....	8			1				
Wyoming.....	3			1				
Colorado.....	67			22		4		
New Mexico.....	6							
Arizona.....	5							
Utah.....	10			2		1		1
Nevada.....	1			1				
Washington.....	14							
Oregon.....	52							
California.....	542			3		23		2
Total.....	2, 135	5	1	39	4	95	85	6

¹ Reported Incidence of Notifiable Diseases in the United States, 1957, Morbidity and Mortality Weekly Report, Annual Supplement, vol. 7, No. 53, National Office of Vital Statistics, Public Health Service.

² One confirmed case and two presumptive cases of St. Louis encephalitis.

³ Confirmed.

In several States large numbers of mosquito pools, primarily *Culex tarsalis*, were examined for virus. Most investigators processed pools of 50 mosquitoes.

The results reported for 1957 by the California State Department of Public Health are compared with results in the State for other years, where similar techniques in collection were used (4):

Isolations	1954	1955	1956	1957
Pools tested.....	989	1,113	1,047	920
Pools positive.....	238	82	145	93
WE virus.....	151	68	143	44
SLE virus.....	87	14	2	49

Some 65 pools of *C. tarsalis* were positive for WE in collections from the Denver and Greeley areas. From 5 to 20 pools were positive among those tested from Texas, Idaho, North Dakota, and Washington. All isolations were from pools of *C. tarsalis* except the pools of *Culex quinquefasciatus* from Cameron County, Tex.

Western encephalitis made a late seasonal appearance in the region of Baldwin County, Ala., where eastern encephalitis is known to be endemic. In late October and November, three isolations were made from pools of *C. melanura* and three from wild birds.

St. Louis Encephalitis

After an interval of 2 years, SLE returned during 1957 in epidemic force to the Rio Grande Valley of Texas. The disease occurred for the second consecutive year in the high plains region also, but to a much lesser extent.

The outbreak in Cameron County, Tex., with some 119 clinical cases, was fairly classic for SLE. The area is semitropical, with an unusually large wild bird population. After a period of heavy rains, a long drought provided ideal conditions for the emergence of numerous *C. quinquefasciatus* mosquitoes. Cases began occurring around mid-July, reaching a peak during the last week in July and the first week in August. By the end of the month no new cases were being reported.

The attack rate was 160 cases per 100,000 inhabitants for the entire area, with considerable local variations. Harlingen was the major

urban center affected. The attack rate there was about 140 per 100,000.

The distribution by age and sex did not differ from other SLE epidemics in this area east of the Rockies. Cases occurred in all age groups, with the greatest concentration between 21-40 years of age (51 cases), but the highest attack rate occurred among persons over 60. The large number of men between 21-40 years who became ill is partially explained by the age distribution of the population which is affected by the proximity of an Air Force base and the employment of numerous braceros. There were three deaths: two men, ages 60 and 84, and one woman, age 86. A total of 42 cases were serologically confirmed in two laboratories as SLE by fourfold or greater rise in complement fixation antibody.

During the outbreak, control measures were instituted by State, local, and military and other Federal agencies. These were directed principally toward a large-scale dusting campaign, using a 3 percent gamma isomer of benzene hexachloride ($C_6H_6Cl_6$).

In California, confirmation of 23 cases of SLE from 11 counties was reported. The age distribution of the patients was quite similar to that in previous years, with eight below age 10 and nine over age 30. This distribution is higher than for WE in this area, where more than two-thirds of the cases are in infants and children, but lower than for SLE cases occurring east of the Rockies, where more than two-thirds were in adults. Virus isolations from *C. tarsalis* pools revealed 49 recoveries, as compared with 2 in 1956.

In Colorado, where SLE predominated in 1956, only four cases were confirmed, but these were of unusual interest as all but one occurred in infants, paralleling the age pattern in the larger WE epidemic in that State. Four confirmed cases were registered in Kentucky, two of which occurred in Jefferson County, the site of a sizable urban outbreak in 1956. Perhaps even more significant was a single case from Clayton County, Mo., which is the first proved case, to our knowledge, in the St. Louis area in many years. There was also a strongly presumptive case in Illinois.

The single case of SLE that occurred in Florida in a 21-year-old man was unique. It

Table 2. Reported encephalitis cases in horses, by State, in 1957

State	Re-ported cases ¹	Total deaths ¹	Virus isola-tion ²	Serol-ogy ³
New Jersey	2	2		
Indiana	4	2		
Illinois	14	6		
Wisconsin ⁴	4			
Minnesota	15			
Iowa	2			
Missouri	4			
North Dakota	9			
South Dakota	58	18		
Nebraska	77	22		
Kansas	28	1		
Delaware	2	2		
North Carolina	14	14		
South Carolina	59	38	4	
Georgia	83	67	7	
Florida	368	237	5	
Tennessee	8	8		
Alabama	67	64	5	
Mississippi ⁴	3	3		
Arkansas	5	5		
Louisiana	92	85	7	
Oklahoma	13	2		3
Texas	133			
Montana	34			
Idaho	79	14		
Wyoming	16	3		
Colorado	80	9		3
New Mexico	69	17		
Arizona ⁴	18			
Utah	77	11		19
Washington	36			7
Oregon	36	7		5
California	16	2		4
Total	1,525	639	28	41

¹ Data from Animal Disease Eradication Division, U.S. Department of Agriculture. ² All eastern encephalitis. ³ Western encephalitis. ⁴ Four cases from these States were confirmed, but the test system is not known.

antibody and viral findings from a study in Florida are equally important epidemiologically.

Western Encephalitis

About 40 confirmed human cases of WE occurred in 1957, as in each year since 1955, when routine surveillance of encephalitis began. For the first time, however, the majority of cases emanated from a single epidemic, a small outbreak in Denver, Colo. Data from minor foci,

which cover a more restricted geographic area than in previous years, are presented in table 1.

About half of the human cases that occurred in Colorado were in the Denver area. Cases occurred from mid-July to the first of October. Although more than 100 clinical cases were reported, laboratory confirmation was obtained for only 22. The age pattern of these confirmed cases conforms closely to the national experience over recent years, with almost 50 percent of the cases occurring in infants (table 3).

Table 3. Age distribution of confirmed encephalitis cases, 1957

Age group, in years	EE	WE	SLE
0-1		12	4
1-4	1	4	5
5-9	12	3	9
10-14		3	2
15-19	2		7
20-29	1		20
30-39		2	15
40-49		2	8
50-59		1	4
60-69			5
70-79		3	4
80-89			1
Unknown		9	11
Total	5	39	95

¹ One case was presumptive.

The disease in horses was concentrated mainly in an area extending from the northwestern corner of Utah up through Idaho to the western portions of Oregon and Washington. Very few human cases were noted in these areas. Sporadic cases also occurred in the Dakotas, Montana, Wyoming, and Nevada.

Although close surveillance of encephalitis was continued in California in 1957, only three cases of WE were confirmed and one of these possibly originated outside the State (4). One of the patients, a 3-year-old boy, became ill on March 23, which is the earliest known date of onset recorded in the State.

Since WE is not particularly lethal to horses, virus isolations are infrequent. All confirmed cases in horses in 1957 were proved by serologic methods; they occurred in California, Colorado, Oklahoma, Utah, Washington, Wisconsin, Oregon, Arizona, and Mississippi.

In several States large numbers of mosquito pools, primarily *Culex tarsalis*, were examined for virus. Most investigators processed pools of 50 mosquitoes.

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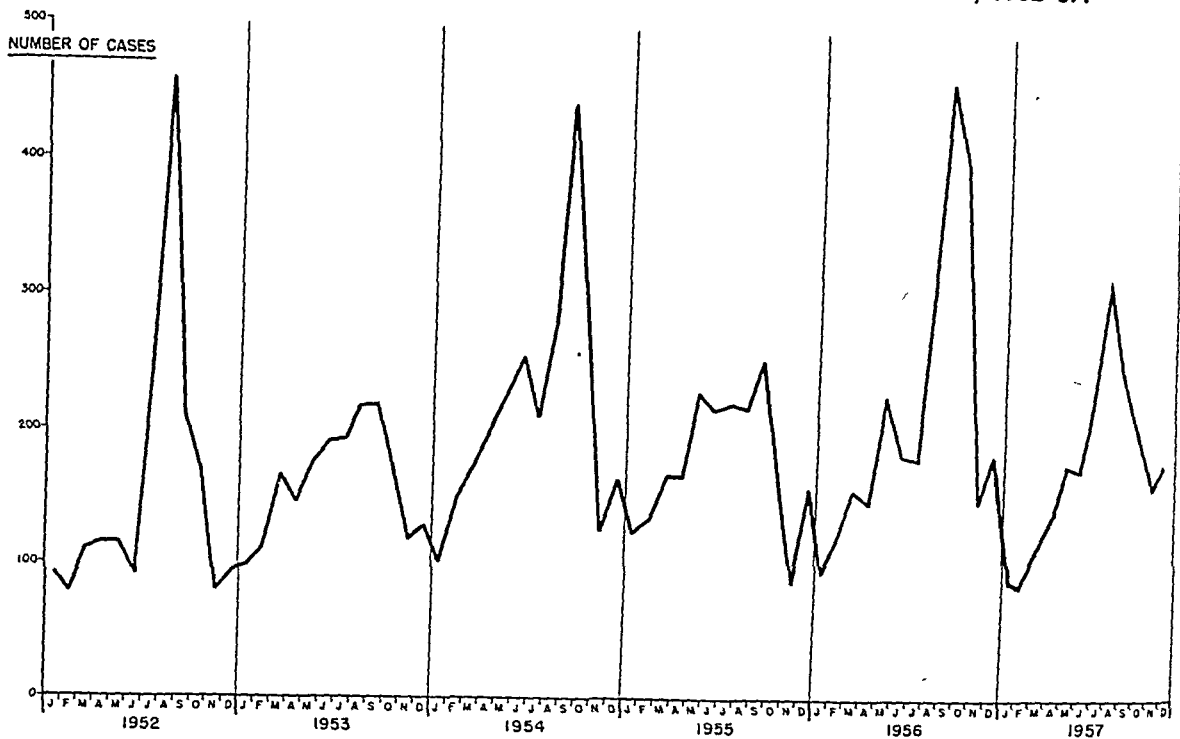
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Figure 2. Reported infectious encephalitis cases in the United States, 1952-57.



is the first report of this disease entity in the State and the first diagnosis made by virus isolation from cerebrospinal fluid. Isolation of SLE virus from body fluids has been successful only once previously, in 1946 from peripheral blood (5).

Indicative of a persistent low level of SLE virus activity in other areas were isolations of the virus in pools of unengorged *C. tarsalis* mosquitoes in North Dakota, Idaho, Colorado, and Washington. A pool of engorged *Culex pipiens* mosquitoes collected from a chicken coop in the vicinity of two human cases in Bullitt County, Ky., provided further verification of virus activity in that area.

National Case Reporting

The monthly incidence of acute infectious encephalitis in humans for 1957 has been compiled from weekly morbidity reports submitted by States to the National Office of Vital Statistics. Comparison with corrected final monthly totals of reported cases for recent years indicates a lower third quarter peak for 1957

than for 4 of the past 5 years (fig. 2). This total represents all reported cases of post- and para-infectious encephalitis and lymphocytic choriomeningitis along with the arthropod-borne encephalitis. Although many cases in 1957 reported as encephalitis were later shown to be aseptic meningitis, the total of 2,135 cases is below that of the previous 3 years. In 1956 the figure was 2,624. Table 1 gives figures of acute encephalitis by State, as well as confirmed cases and deaths from arthropod-borne encephalitis.

The 1,525 cases in horses, with 639 deaths reported by States to the U.S. Department of Agriculture (6), was the largest number of encephalitis cases in equines reported since 1953 (table 2). As for the past 3 years, about one-half of the reports on horse cases were from the east coast, where there are proportionately smaller numbers of horses. This may be partially a reporting artifact since EE prevalent in the area is 90 percent fatal and therefore well reported. The milder course of western encephalitis in horses, as reflected by a low case fatality rate, may fail to stimulate reporting of this dis-

ease in large horse populations of the western United States.

Discussion

Control and ultimate eradication of arthropod-borne encephalitis is dependent to a large extent on the gradual accumulation and interpretation of information. While few human cases occurred in 1957, the viruses were widely dispersed throughout nature. By means of active surveillance, certain general trends and findings have become apparent.

Only five cases of EE appeared in humans in 1957, while a large epizootic occurred among horses in the Gulf States. Human cases were confined to Florida and Louisiana. Only one death occurred among these cases, which is consistent with the finding that this disease is somewhat milder in the Gulf States than in Massachusetts, the other major area of concentration of EE cases.

Evidence is accumulating that *C. melanura* is the most important vector in the avian-mosquito cycle of EE. Whether this mosquito is the vector for human cases is not clear, although the first human biting record for *C. melanura* in nature was obtained during 1957.

As would be expected in a mosquito-borne disease, weather apparently influenced virus activity. From North Carolina northward very little rain fell during 1957 and there was almost no virus activity. A major epizootic, however, occurred along the Gulf. In 1956, when rain was plentiful in New England, the virus was considerably more prominent.

While most of the human cases of WE were centered about the Denver area, horse cases and virus isolation from birds and mosquitoes clearly indicate that this disease is very widespread in nature. Cases in humans continue to occur predominantly among infants. Evidence from studies in California (7) indicates that younger cases are most likely to have sequelae. When one considers that an increasing area in the United States comes under irrigation each year and that the extremely efficient vector *C. tarsalis* is becoming more abundant, the magnitude of the potential hazard of WE is demonstrated.

Since the first epidemic of SLE in St. Louis

in 1933, this disease has appeared periodically in epidemic form. The epidemic in Cameron County, Tex., in 1957 was typical of the disease. SLE virus, like that of WE, occurs widely throughout nature.

The factors maintaining these viruses in nature and the sudden precipitation of epidemics are being studied intensively. One fact which seems to be emerging is that large epidemics of SLE are preceded by periods of heavy rain, followed by drought. This cycle apparently favors the breeding of the major vector *C. quinquefasciatus-pipiens*, which breeds best in still water with a high concentration of inorganic salt and organic materials.

Investigations continue on the mechanism of overwintering of the virus and the biology of the mosquito vectors. The possible role of mammals as hosts for the virus and the migratory pattern of birds and their nesting habits in relationship to virus activity are also being studied. In the laboratory, levels of viremia of possible hosts and their infectivity for possible vectors are being elucidated. In the field, the value of predicting epidemics by periodic collection of mosquitoes for virus isolation and regular bleeding of sentinel birds to detect the introduction of the virus into an area are being tested, while the prognostic use of meteorological data such as ground and air temperature and rainfall are under investigation. The problems are varied and diffuse, but experience in 1957 slowly brings us a step closer to the goals of effective control of arthropod-borne encephalitis.

Summary

During 1957, surveillance of arthropod-borne encephalitis revealed fewer cases of the diseases than for the previous year among humans and more plentiful cases among horses. The only major epidemic was an epidemic of SLE in Cameron County, Tex. Five cases of EE in humans were reported, and an epizootic among horses occurred along the Gulf States. Human cases of WE were centered about the Denver area, while the sum of virus activity in man, animals, birds, and mosquitoes, for both SLE and WE, was widely distributed throughout the country. SLE continued to be the ma-

for public health problem among the arthropod-borne encephalitides, with the epidemic occurring in Texas and confirmed cases occurring in six other States.

Several advances toward ultimate control of these diseases were made by better understanding of host and vector potentialities and the influence of meteorological conditions on viral spread.

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Anticancer Drug Development

For the first time, a pharmaceutical firm has been contracted by the Public Health Service to develop, test, and manufacture antibiotics and related drugs for the treatment of cancer. The award, which runs until the end of 1959, was made by the Service's Cancer Chemotherapy National Service Center at the National Cancer Institute, to the Upjohn Co. of Kalamazoo, Mich.

Drugs found safe in research by the company will be evaluated in clinical trials under the direction of the service center. If the results indicate the drugs are of real value, the company is obligated to undertake their production.

Terms of the contract are in line with the new patent policy of the Department of Health, Education, and Welfare, which permits a contractor to patent and sell drugs or other chemical agents developed under contract with the Government. However, if the manufacturer fails to supply adequate quantities to meet the public need, the Surgeon General of the Public Health Service may license other firms to produce the drug.

publications

Health Statistics From the U.S. National Health Survey. Hospitalization: patients discharged from short-stay hospitals, United States, July 1957-June 1958. *PHS Publication No. 584-B7; 1958; 40 pages; 30 cents.*

Estimates of discharges and hospital days, percentage distributions, rates per 1,000 persons per year, and average length of stay are shown for four major characteristics: age, sex, hospital ownership, and type of hospital service.

The report also presents data dealing with socioeconomic variables, length-of-stay intervals, conditions for which the patients were hospitalized, and number and type of surgical cases. Appendixes carry technical notes on methods and give definitions of terms.

Salaries of State Public Health Workers, August 1958. *PHS Publication No. 647; 1958; 41 pages.*

Data in this report, taken from State and Territorial health department payrolls, include salaries of health officers, program directors, and various occupational groups.

Graphs and tables show distributions by State or by Bureau of the Census region.

Social Security Programs Throughout the World, 1958. *Social Security Administration Publication (Unnumbered); 1958; 115 pages; \$1.*

Intended to provide complete and up-to-date information, this report summarizes social security programs, including financial provisions, in 78 countries. It discusses old-age, invalidity, survivors, health, maternity, unemployment, and work injuries insurance as well as family allowance and other related programs.

The material, supported by 93 pages of charts, was drawn primarily from foreign laws or authoritative translations. It was supplemented by foreign service dispatches of the

Department of State and publications of the International Labor Office, the International Social Security Association, and social security agencies of foreign countries. Many of the summaries have been approved by social security officials in the countries concerned.

Proceedings, 1958 Annual Conference, Surgeon General, Public Health Service and Chief, Children's Bureau, With State and Territorial Health Officers. *PHS Publication No. 653; 1959; 56 pages.* Includes remarks and addresses by the Secretary, Department of Health, Education, and Welfare, the Surgeon General, Public Health Service, the Chief, Children's Bureau, and the Chief, Division of Special Health Services, Bureau of State Services. Presents recommendations on Federal relations, environmental sanitation, infectious disease, hospitals and mental health, special health and medical services, long-term illness and health of the aging, Indian health, and migrant labor. Contains resolutions adopted by the Association of State and Territorial Health Officers.

More Than Bread. *Social Security Administration Publication (Unnumbered); 1958; by Helen C. Manning; 24 pages; 15 cents.*

Directed to community leaders, civic groups, and others interested in community welfare, this booklet describes social services in public assistance. It offers suggestions for community projects designed to increase understanding and support of social services.

Vignettes are used to show responsibilities shared by public welfare agencies and the community for helping needy people. The results achieved through social services are highlighted in reports of projects conducted in several States.

In addition to copies for sale by the Superintendent of Documents

(see note below) free copies in limited quantities may be obtained from the Office of the Assistant to the Director, Bureau of Public Assistance, Social Security Administration, Washington 25, D.C.

Reported Tuberculosis Data. Calendar year 1956. *PHS Publication No. 638; 1959; by Lawrence W. Shaw and Paul L. Roney; 25 pages; 25 cents.*

This fifth annual summary presents data supplied to the Public Health Service on the Annual Tuberculosis Report by the States and Territories. The data cover newly reported tuberculosis cases for each State by source of morbidity report, activity status, form and extent of the disease, race, sex, and age as well as X-ray casefinding activities and mortality.

Summary tables present United States totals for the years 1952 through 1956, and accompanying text points out pertinent characteristics inherent in the data.

Better Teeth for Life—Fluoridation. *PHS Publication No. 636; 1958; 16 pages; 15 cents.*

This popularly written booklet tells the story of the research that led to fluoridation of public water supplies. It also outlines the seriousness of the dental health problem and summarizes the progress of fluoridation in this country and abroad.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

Signs

and

Symptoms

of trends in public health

Radiation from some luminous watches is "several times greater than natural background radiation and exceeds by more than 100 times that presently received from radioactive fallout," reported G. D. Chase and A. Osol in the October 1958 issue of *Science*.

In 5 years, they found, one is subjected to a dose of 5 rem; the International Commission of Radiation Protection recommends no dose in excess of 5 rem by age 30.

" "

Local SS Medical Institute, a new medical center in St. Louis, Mo., financed with health and welfare funds of the Meat Cutters Union, Local 88, was dedicated in October, during the 86th APHA conference.

" "

National Science Foundation says survey of 127,000 American scientists showed that three out of four know at least one foreign language. Only about 2 percent have some knowledge of Russian, and 1 percent know Chinese or Japanese.

" "

The division of sanitary engineering, Pennsylvania Department of Health, has published a pamphlet entitled, "Your Clean Streams Program."

" "

Dr. Charles S. Cameron, dean, Hahnemann Medical College, has called for a permanent national commission to recommend and coordinate medical research and indicate the relative emphasis to be placed in each field. It should be possible, he says, to agree reasonably on the relative importance of, say, cerebral palsy and better teeth.

The North Carolina State Board of Health has issued a 527-page, indexed volume on Public Health and Related Laws of North Carolina.

" "

Twenty new medical schools would have to be added to the 87 now existing or planned if the 1955 ratio of 131.9 physicians per 100,000 population is to be maintained in 1975, G. St.J. Perrott and M. Y. Pennell report in the *Journal of Medical Education*, September 1958. They also point out that the Association of American Medical Colleges has advocated the establishment of new 2-year schools of basic medical sciences as a means of increasing the enrollment of third-year classes of existing medical schools by 400 students each year.

" "

Forty-five State health departments now recognize accident prevention as a public health responsibility and engage in some degree of activity; 13 departments have a full-time accident prevention staff of one or more persons.

" "

About 50 million people suffer "accidental" injury yearly, the National Health Survey, Public Health Service, reports after a 6-month study. About 40 percent are injured at home, 17 percent at work, and 10 percent by motor vehicles. The remaining 33 percent suffer accidents from other causes, including those in public places during recreation.

" "

Automobile Safety is a new, 8-page, quarterly, published by the Automobile Manufacturers Association.

A manual entitled "Emergency Childbirth" has been written by Dr. Gregory J. White, and published by the Police Training Foundation, Franklin Park, Ill.

" "

Britons, in addition to their government's free medical service, now can buy medical insurance which includes the services of family physicians.

" "

With the aim of discovering clues to prematurity and malformations at birth, the University of Pittsburgh Graduate School of Public Health has received \$60,000 from the National Institutes of Health, Public Health Service, and the Association for the Aid of Crippled Children to study methods of obtaining accurate, scientifically useful information from pregnant women. Two hundred women from the Pittsburgh area will be asked questions on their daily eating habits, physical activity, and characteristic symptoms.

" "

The British Occupational Hygiene Society is organizing an international symposium on Inhaled Particles and Vapors for April 1960. Those wishing to contribute papers should notify W. H. Walton, Worton Hall, Worton Road, Isleworth, Middlesex, England.

" "

Use of closed-circuit TV for training and instruction in science may be enhanced by Eidophor, a device which projects an image in color on a screen wider than 13 feet. The instruments promise advantages in resolution, definition, and color fidelity.

" "

The Atomic Energy Commission has announced a plan (subject to hearing) to license a Texas corporation to collect and prepackage low-level radioactive waste, encase it in reinforced concrete, and sink it at least 6,000 feet in the Gulf of Mexico about 180 miles south of Galveston, beyond the Continental Shelf. It is presumed that, even if the packages break, the radioactivity of surface water would not rise above permissible levels.

The Nation's first clearly established case of rabies infection in a human from a bat's bite was reported in December 1958 by the California State Health Department.

" "

The Atomic Energy Commission announced in November 1958 that it will report to the public on radiation accidents which took place in plants operating under licenses from the Commission. The Commission also plans to publicize special reports from licensees on safety matters.

" "

A program of integrated training for law and medical students in Massachusetts is being set up with the assistance of Professor William J. Curran, Medical Research Institute, Boston University. The training will help physicians become better witnesses in court and help lawyers to conduct questioning with better understanding of medicolegal cases.

" "

Maternal mortality rate in this country has declined 93 percent in the last four decades—from 1 death in 165 live births in 1915 to 1 death in approximately 2,300 live births today.

" "

For the first time, a serial research publication, entitled "Wildlife Disease," is being issued in microfilm. The first copy appeared in January 1959. Original manuscripts are printed on 3" x 5" cards. A maximum of 47 pages of text are printed on each card. No more than one article appears on a card.

" "

Highway fatalities declined in 1958 for the second consecutive year. In 1957 there were 1,100 fewer highway fatalities than in 1956 when a record of 39,600 was set. In 1958 fatalities declined another 1,500 to 37,000.

" "

Vitamin preparations are the subject of a comprehensive report by the American Medical Association Council on Foods and Nutrition, published in full in the January 3, 1959, issue of the *Journal of the American Medical Association*.

Twelve home accident prevention seminars, sponsored by the Tennessee Department of Public Health, were held in a number of counties in that State during 1958. Exhibits, informational materials from insurance companies, and films accompanied talks and discussions.

" "

The Army has developed an emergency medical packet for use in treating mass casualties, civilian or military. It will be used by all three services. The packet has 23 items and medical material adequate to care for 100 casualties in 72 hours. The container is light and inexpensive, easily identified by color or symbol, and may be sealed against tampering. It is easily carried by one person.

A countywide glaucoma and diabetes screening survey was conducted in rural Graham County in western Kansas during April 1958. Of the 593 persons over 40 years of age screened for glaucoma, 23 were referred for further examination. Eleven of those referred were diagnosed as having the disease. Of the 694 persons over 35 years of age tested for diabetes, 22 were found to be positive.

" "

Fellowships in human ecology and its relation to health have been established by Cornell University Medical College. Inquiries should be addressed to Dr. E. Hugh Luckey, New York Hospital-Cornell Medical Center, 525 East 68th St., New York 21, N.Y.



State police conducted rigid carbon monoxide detection tests on 8,000 school buses throughout Pennsylvania during August 1958. Buses with even a trace of carbon monoxide were held for special inspection of the exhaust system.

Air samples from the front and rear of buses were taken with a

hand-held instrument equipped with a sensitive detector tube (see illustration). If carbon monoxide is present, the contents of the tube turn green. The amount of carbon dioxide present is indicated by the intensity of color, which is compared with a color scale mounted beside the tube.

RPR testing projects have been established in the five border reception centers at El Paso, Hidalgo, and Eagle Pass, Tex., Nogales, Ariz., and El Centro, Calif., by the Division of Foreign Quarantine to screen all braceros on a routine, year-round basis. The RPR test has also been used successfully in demonstration projects in Cook County Jail in Chicago and with migrant groups in North Carolina and Arizona.

selected for comparison with the RPR test because they represented a slide flocculation, tube flocculation, and a complement fixation test with cardiolipin antigens and a test using treponemal antigen.

To obtain sufficient reactive specimens for a valid comparison of these tests, approximately one-half the sample was drawn from persons reactive to the rapid plasma reagin test, the other half from those who were nonreactive.

Results

diagnosed as pinta. Eight workers had previously received adequate treatment for syphilis and 130 could not be located.

Those workers for whom treatment was indicated received 2.4 million units of benzathine penicillin G as a single 4-cc. intramuscular injection. All but two in the primary and secondary stage were discovered as lesion suspects by the Foreign Quarantine personnel in their routine health examination, demonstrating the effectiveness of this inspection, and were confirmed as darkfield-positive by the special project physician assigned by the Venereal Disease Branch.

In the total group of 47,579 braceros tested, the RPR test was nonreactive in 90.4 percent, weakly reactive in 1.4 percent, and reactive in 8.2 percent. The corresponding percentages for the sample group of 1,672 specimens were 45.8 percent nonreactive, 6.3 percent weakly reactive, and 47.9 percent reactive (table 1). The ratio of weakly reactive to reactive was 1:5.9 in the total group and 1:7.6 in the sample. Among the other four tests performed on the sample, the VDRL slide test obtained the highest percentage of nonreactive results (55.7); and the TPCF test, the lowest (35.5).

Methods

In order to compare the performance of the RPR test to several other blood-testing procedures, a total of 1,672 blood specimens from braceros previously tested by the RPR test at El Centro were shipped to the Venereal Disease Research Laboratory at Chamblee, Ga., where the VDRL slide, Kolmer cardiolipin complement fixation, Hinton flocculation (2), and *Treponema pallidum* complement fixation (3) tests were performed. These tests were

A comparison is made in table 2 of the results of the rapid plasma reagin test with corresponding results of the VDRL, Hinton, Kolmer, and TPCF tests in 1,604 specimens giving definite results to all tests. Among 747 specimens nonreactive to the RPR test, almost parallel nonreactive results are seen with the VDRL slide test (99.5 percent), Hinton (99.1 percent), and Kolmer (98.4 percent). The TPCF test shows least agreement, with only 69.2 percent nonreactive. The 103 specimens weakly reactive to the RPR test were 77.7

Table 1. Total sample of 1,672 specimens from El Centro, Calif., by test result

Test	Nonreactive		Weakly reactive		Reactive		Anticomplementary		Not tested	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
RPR.....	766	45.8	105	6.3	801	47.9				
TPCF.....	593	35.5	271	16.2	758	45.3	30	1.8	20	1.2
Kolmer cardiolipin.....	809	48.4	29	1.7	813	48.6	11	.7	10	.6
Hinton flocculation.....	829	49.6	37	2.2	774	46.3			32	1.9
VDRL.....	932	55.7	143	8.6	591	35.3			6	.4

Table 2. Comparison of RPR test with VDRL, Hinton, Kolmer, and TPCF tests in 1,604 specimens from El Centro, Calif., giving definite results to all tests (anticomplementary and not tested excluded)

Result of other tests	VDRL slide		Hinton flocculation		Kolmer cardiolipin		TPCF	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
747 specimens nonreactive to RPR								
Nonreactive.....	743	99.5	740	99.1	735	98.4	517	69.2
Weakly reactive.....	1	.1	1	.1	2	.3	119	15.9
Reactive.....	3	.4	6	.8	10	1.3	111	14.9
103 specimens weakly reactive to RPR								
Nonreactive.....	80	77.7	54	52.4	38	36.9	5	4.9
Weakly reactive.....	16	15.5	11	10.7	14	13.6	16	15.5
Reactive.....	7	6.8	38	36.9	51	49.5	82	79.6
754 specimens reactive to RPR								
Nonreactive.....	93	12.3	33	4.4	25	3.3	64	8.5
Weakly reactive.....	125	16.6	24	3.2	12	1.6	135	17.9
Reactive.....	536	71.1	697	92.4	717	95.1	555	73.6

percent nonreactive to the VDRL, 52.4 percent nonreactive to the Hinton, and 36.9 percent nonreactive to the Kolmer test. Only 4.9 percent of these specimens were nonreactive to the TPCF test.

Of the 754 specimens reactive to the RPR test, the greatest agreement is with the Kolmer test, with 95.1 percent reactive and only 3.3 percent nonreactive; agreement is also close with the Hinton test, in which 92.4 percent of the specimens were reactive and 4.4 percent nonreactive. Oddly enough, the VDRL slide and TPCF tests, at opposite extremes in reactivity in specimens nonreactive and weakly

reactive to the RPR test, have approximately the same reactivity rates, 71.1 and 73.6 percent, respectively among specimens reactive to the RPR. When weakly reactive and reactive results are combined for each of the compared tests, total reactivity ranges from 96.7 percent for the Kolmer to 87.7 percent for the VDRL in the group of 754 specimens reactive to the rapid plasma reagin test.

The actual percentage of agreement between the RPR and the other compared tests in these 1,604 specimens is shown in table 3. Complete agreement is defined as both tests nonreactive, both tests weakly reactive, or both tests reac-

Table 3. Percentage of agreement between RPR and other tests in 1,604 specimens from El Centro, Calif., giving definite results to all tests

Other tests	Complete agreement		Partial agreement		Disagreement	
	Number	Percent	Number	Percent	Number	Percent
Kolmer	1,466	91.4	63	3.9	75	4.7
Hinton flocculation.....	1,448	90.3	62	3.8	94	5.9
VDRL slide.....	1,295	80.7	132	8.2	177	11.1
TPCF.....	1,088	67.8	217	13.6	299	18.6

tive. A reactive result to one test and weakly reactive result to the other is considered partial agreement. The RPR was in complete agreement with the Kolmer test in 91.4 percent of the specimens and with the Hinton in 90.3 percent. Complete agreement is lowest when the RPR is compared with the TPCF test, 67.8 percent. Disagreement with the rapid plasma reagin test ranges from 4.7 percent for the Kolmer to 18.6 percent for the TPCF test.

In order to determine the type of specimens in which the majority of discrepancies occurred, the results of the TPCF test are compared with the results of the RPR and VDRL quantitative slide test (fig. 1). The general pattern of this chart—an increase in percentage of specimens reactive to the TPCF test with increasing reactivity of the RPR and VDRL slide tests—is broken by the second bar which represents specimens which were weakly reactive to the RPR and nonreactive to the VDRL test. In this group, 80 percent were reactive to the TPCF test and only 3.8 percent were nonreactive. Among 743 specimens which were

Figure 1. Result of TPCF test compared with results of RPR and VDRL tests.

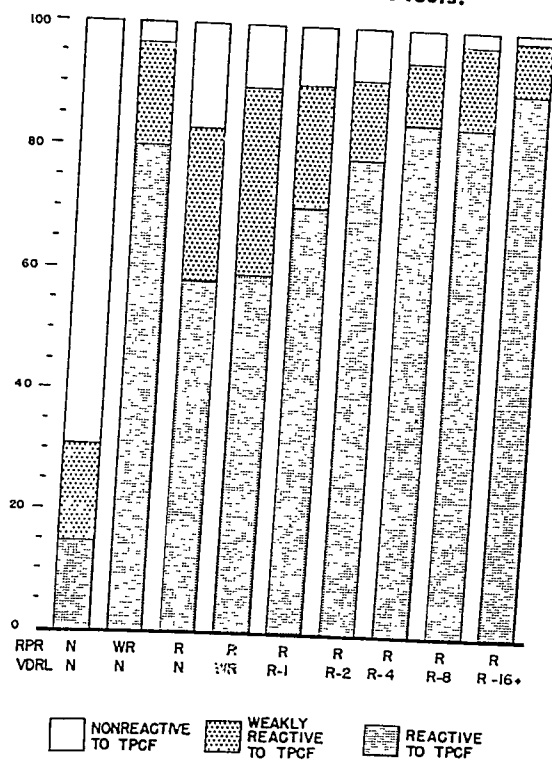
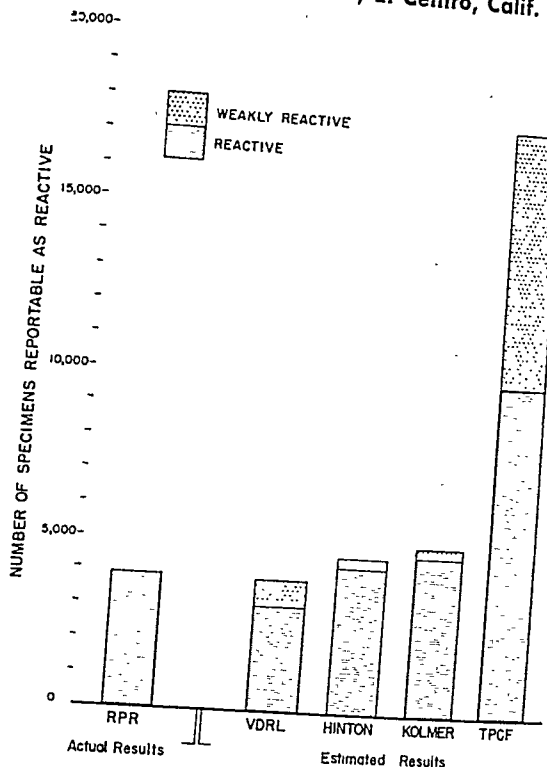


Figure 2. Actual reactivity of RPR test and estimated reactivity of other tests among 47,579 braceros tested in 1957, El Centro, Calif.



nonreactive to both the RPR and VDRL tests, more than 3 out of every 10 specimens showed some reactivity to the TPCF (14.5 percent reactive and 16 percent weakly reactive). Although this latter observation would indicate greater sensitivity of the TPCF test, among specimens reactive to the RPR, the percentage nonreactive to the TPCF ranged from 17.2 percent when the VDRL was nonreactive to 1.3 percent when the VDRL was reactive to 16 or more dil.

On the basis of the results obtained in the sample, estimates have been made of the number of specimens that would have been reportable (reactive or weakly reactive) in the Kolmer, Hinton, VDRL slide, and TPCF tests, had these tests been performed on the total 47,579 specimens. Only the reactive results of the RPR test are reported to the physician at the bracero reception center laboratories, whereas both reactive and weakly reactive results of the other tests are reportable. Therefore, consideration was given to these practices in preparing the estimate for comparison of

these several testing procedures. These estimates are compared with the actual number of specimens that were reactive to the RPR test (fig. 2).

As opposed to the figure of 3,913 specimens (8.2 percent) that were reactive to the RPR test, 3,865, or 8.1 percent, would have been reactive or weakly reactive to the VDRL slide test; 4,547, or 9.6 percent, to the Hinton; 4,948, or 10.4 percent, to the Kolmer; and 17,452, or 36.7 percent, would have been reactive or weakly reactive to the TPCF test. (The TPCF technique employed in this evaluation was found to have a high reactivity and a low specificity in the SERA study (4) and has since been modified by the test's authors.) The actual number of specimens reactive to the RPR test most closely approximates the number of reportable reactions for the VDRL slide test.

Discussion

The group of specimens under consideration was highly selective, being taken entirely from Mexican male laborers with an unknown percentage of associated pinta, and selected on the basis of the result of the RPR test (roughly one-half reactive, one-half nonreactive). The results reported here may differ considerably from results obtained in a random sample of the population. In this series, however, the result of the RPR test agreed closely with the results of the Kolmer cardioliipin and Hinton flocculation tests.

Summary

During the period April 16 through June 28, 1957, a total of 47,579 Mexican agricultural workers were tested with the rapid plasma reagin test at El Centro, Calif. Reactive re-

sults were obtained in 3,913 and weakly reactive results in 685, a total reactivity rate of 9.7 percent.

In this same period a sample consisting of 1,672 specimens from workers tested by the RPR test was subjected to a battery of tests, including the VDRL slide, Kolmer cardioliipin complement fixation, Hinton flocculation, and TPCF, at the Venereal Disease Research Laboratory.

The Kolmer and the Hinton tests were in closest agreement with the RPR test, the percentage of complete or partial agreement being 95.3 and 94.1, respectively. Least agreement was obtained with the TPCF test, 81.4 percent. The TPCF test showed some reactivity in 3 out of every 10 specimens which were nonreactive to both the RPR and VDRL slide tests.

If one of these other tests had been used in place of the RPR at the El Centro reception center, it is estimated on the basis of the sample that reactive or weakly reactive results would have been obtained by the VDRL slide test in 3,865, by the Hinton in 4,547, by the Kolmer in 4,948, and by the TPCF in 17,452 specimens from the Mexican workers tested.

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Current knowledge and thinking about State agency planning for community mental health services are examined.

State Agency Program Planning for Community Mental Health

CHARLES F. MITCHELL, M.A.

IN SPITE of the rapid advance of community mental health services, the dominant theme at national and regional meetings of State mental health personnel is still largely mental hospitals and mental patients. Yet severe mental illness is such a small part of the total picture that it seems important to look at the whole range of mental health needs and services.

The latest available estimates indicate that about 10 percent of the population of the United States have significant mental health problems, but only 0.6 percent are ill enough to require care in a psychiatric hospital (1, 2). The other 90 percent, the so-called normal group, need mental health education and counseling services to help prevent the development of disabling mental illness. In planning programs for community mental health services we have to look at the entire spectrum and visualize all potential needs.

About 10 years ago, in the early stages of community mental health planning, it all seemed pretty simple to us in State mental

health agencies. First, we were supposed to develop further the existing mental health clinics and to start new clinics as rapidly as possible. There was little question as to what kind of clinics they should be. Second, we were supposed to set up an educational program, consisting of talks, workshops, films, and pamphlets, aimed at whatever groups seemed to be interested.

Now we are not quite so glib in discussing or plunging into these activities. We do more systematic and down-to-earth planning, and we use criteria for program selection. But we need to reexamine these criteria frequently and look at the assumptions and principles that underlie them.

Current Assumptions

These are the current assumptions that influence our planning:

★ Two attitudes seem to predominate among those persons who are concerned in some way with community mental health programs. One is the extreme optimism reflected in the idea that "mental health is all," a sort of cultist mental health movement. The other is a pessimistic attitude that "this preventive stuff" is all a nice frill, but "you can't prove that it prevents anything and it is not a real program like some others, and not nearly as important as taking care of the acutely mentally ill."

Mr. Mitchell has been with the Texas State Department of Health for 10 years and director of the division of mental health for 7. The article is based on a talk given at the regional workshop for State-level mental health program personnel held by the Community Services Branch, National Institute of Mental Health, Public Health Service, at Brighton, Utah, April 21-25, 1958.

Somehow we have to find a middle ground and recognize the climate of public opinion in which we have to operate.

- ★ Community mental health programs in most States are going to be small for a long time, because no large appropriations will be made until we have specific preventive methods that are more definitely proved. Moreover, there are not likely to be pressure groups available, such as the councils for the mentally retarded, to get funds for our programs. We don't have an organization of relatives of the neurotic who are going to work with State legislatures to get funds.

- ★ The number of professional mental health personnel will not greatly increase in the next 5 to 10 years.

- ★ No one type of program will do the job, nor is it possible to carry out all of the potentially productive community mental health activities.

- ★ Mental health associations and other lay groups are already carrying on educational programs, some of them in community mental health. Such programs are likely to increase further in both number and scope in the future.

- ★ Many nonmental health professional persons and agencies already perform various community mental health functions. They have varying degrees of awareness of their actual and potential roles. These people and agencies can be aided through consultation and organizational measures to do a much more effective and comprehensive job. Some already are seeking such help.

- ★ Existing mental health clinics are not being fully utilized. For example, the recent study of the Los Angeles Child Guidance Clinic showed that nearly 80 percent of the cases seen in 1 year could have been treated just as well or better by other local agencies or by private practitioners (2). In addition, it seems obvious that clinics can do much more consultative and educational work with other agencies and practitioners and can relate their traditional services more directly and meaningfully to those of other agencies.

- ★ Psychiatric services in general hospitals are growing rapidly in number, size, and function. It is an open question how well such services are currently integrated into local and

State patterns of community mental health services.

- ★ Local policymaking and control are essential for long-range, permanent growth of community mental health services, if the services are to endure. State control and operation tend to inhibit local growth and participation. Of course, this assumption is affected by State and local traditions and the geography and economy of a particular State.

- ★ State agency planning for local mental health services must take into account local experience and the attitudes and methods traditionally used in other civic projects. Hunter has highlighted the importance of local power structures in this connection (4, 5).

- ★ The nature of the State program for community mental health will be markedly affected by its parent agency and the value systems of the particular professional disciplines on the staffs of the State program and the parent agency.

Principles and Basic Questions

The State agency obviously must accept the dual responsibility of developing further existing patterns of service and of initiating projects which test different combinations of approaches to preventive services in mental health while evaluating the effectiveness of both the old and the new.

Selecting preventive program areas is difficult. We need activities which are tangible, dramatic, convincing, and based directly on need. We cannot continue indefinitely on faith or on the basis of testimonial evidence that we are doing something that justifies our use of the taxpayer's dollar.

Also we are recognizing more clearly that clinics are expensive and that they alone cannot meet all the mental health needs of the community. Clinics provide an essential service, but perhaps should be thought of as a springboard for other activities.

It seems helpful to categorize the kinds of possible activities according to four levels of prevention so that we get some idea of the scatter of our various activities among these levels.

Level 1 prevention consists of building and

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potential in community mental health. Perhaps the most important task of the State agencies is to convey a spirit of experimentation and evaluation of diagnostic and treatment functions to the clinics and the psychiatric services of the general hospital.

Perhaps we can, to some extent, motivate clinic directors, boards, and staffs to reexamine traditional procedures, such as the handling of waiting lists, diagnostic procedures, treatment methods, preventing dropouts of patients, followthrough of treated patients with referrals to other agencies, and followup studies of patients already seen.

Another goal might be to encourage existing clinics to devote more staff time to consultation, education, and community organization functions. Perhaps we should insist that new clinics devote a certain portion of staff time to these functions in addition to diagnostic and treatment services.

Clinicians in general are increasingly aware of their potential contribution to and of the value of such activities, but to what extent are they able to perform consultation and education functions? Should we encourage the clinics to serve as a hub for all community mental health activities? Can we expect them to do this without special training for their staffs? And should the State agency provide scholarships for advanced training to help clinic staffs carry out new methods of service to the community? Where can one get such training? Perhaps the State agency should attempt to provide it.

Another question concerns existing services. What are the disadvantages and advantages of written agreements if financial aid is provided to the clinics? Is it sound to use such agreements as a basis for periodic discussions of the clinic's program and function? Few persons would argue that the State agency should not set some standards, particularly for personnel. It is surely appropriate to encourage the clinic to use State agency staff in a consultative capacity, both in basic administration and in various specialized clinic functions.

In a number of States, statewide workshops on a variety of topics or inservice training programs for staffs have been undertaken with considerable success.

The recently developed statistical reporting system for psychiatric outpatient clinics provides an opportunity for an overview of clinic services. In Texas we found that having our annual workshop of psychiatric clinic staffs immediately following the publication of the annual statistical report seemed to stimulate clinic staff thinking and resulted in productive discussion.

Developing New Services

New services can be divided into those which are initiated by the State mental health agency, those initiated by another State agency, and those initiated locally. This is an arbitrary grouping, and any of the following kinds of services could be initiated by any one of the three sources, but in our experience this grouping seems reasonable.

At the present time we are convinced that four professional groups, physicians, nurses, teachers, and clergy, are in a strategic position to foster the mental health of the people they serve. What is the State mental health agency's responsibility to them? Should we at least be aware of the extent to which the schools of medicine and nursing, the teachers colleges, and theological seminaries include in their regular curriculums indoctrination and training in concepts and methods in community mental health? The National Institute of Mental Health, Public Health Service, is providing grants to schools of nursing, among others, for this purpose. But it is our experience that the professional schools want to know how to integrate community mental health into their curriculums and how to relate this to professional practices in the State as a whole.

Another kind of new project, mentioned previously, might consist of detecting early cases of emotional or personality disturbance in gifted children and providing prompt treatment for them and their families. The State agency might initiate this service in one or more school systems and test it for several years. Such a program should be set up to encourage continuation by the schools following completion of the pilot project.

Many States have services for expectant

maintaining mental health through programs that teach the best current knowledge and the best methods of fostering healthy parent-child relationships and human relationships generally.

Level 2 includes all the activities carried out by the nonmental health professional people in private practice or as staff of health, welfare, and education agencies. The physician, nurse, teacher, social worker, clergyman—all those in a “caretaking” capacity in the community—can do early casefinding and provide counseling and guidance to individuals, particularly children, showing symptoms of emotional disturbance.

In this level, we are inclined to overlook the significance of the clergy. A public opinion study done in Louisville, Ky., a few years ago showed that people turn most frequently to their clergyman when they have problems.

Level 3 prevention consists of services provided in clinics, primarily diagnosis and treatment of moderate emotional disturbances.

Level 4 consists of services in general hospitals for the acutely ill psychiatric patient, as well as rehabilitation of mental hospital patients who have returned to the community.

Probably the major dilemma in program planning is where to begin in the whole spectrum of possible services. Should we try to improve the mental health of the entire population, or concentrate on the 6 percent of the families who have a high incidence of social and emotional disorders?

A promising approach is to focus on populations at risk. Schwartz lists nine groups worthy of concentrated efforts in community mental health (6):

1. Juvenile delinquents. For his purpose Schwartz limits this category to delinquents whose parents have been in trouble with the law.

2. Persons who have attempted suicide.

3. Those in urban areas where the rate of incidence for mental illness is high.

4. Expectant mothers who need help in preventing organic damage to the unborn child and in emotional problems.

5. Children under 3 years of age who are physically and emotionally deprived of mothering (7).

6. Families on relief.

7. Bereaved persons who need help in handling their “grief work,” as described by Lindemann (8).

8. The acutely psychiatrically ill. Psychiatrists and other mental health staff can provide emergency services at home to prevent hospitalization. Successful programs of this kind have been carried out in Amsterdam in the Netherlands and in Philadelphia, Pa.

9. Persons who are slated for promotion to positions at a higher level. This group has a high incidence of problems.

Another approach, advocated by Caplan of the Harvard School of Public Health, is to center efforts on the crisis periods in people's lives when they are most amenable to changes in basic attitudes (9).

Certainly we must compromise in considering the direction and the distribution of mental health activities. For example, if we can conduct only two special demonstration projects during a given period, probably it would be a good idea to work with one group in which the risk is not commonly recognized, such as gifted children. The other might focus on a group, such as aged persons in nursing homes, whose actual or potential mental health problems are apparent to most people.

Should we try to provide services to all geographic areas of the State? We might provide educational materials to the entire State; then, in a few areas, set up projects as demonstrations and encourage other communities to emulate those which appeal to them.

Another question is whether to move into communities that do not request services. When there are epidemics or excessive mortality or morbidity rates, public health teams traditionally have moved in without waiting for an invitation. Yet most of us question whether permanent gains in community health are made without local initiative and local assumption of responsibility and leadership. How long do we wait before we approach a community which requests no services but has obvious and critical needs?

Developing Existing Services

In considering existing patterns of services, probably nobody claims that the mental health clinics at present are working at their maximum

often initiated by other agencies are teaching child development, parent-child relationships, and other topics through study groups such as those sponsored by local mental health associations. Another such program carried out by many universities is mental health inservice education, consultation, and similar services to agency staffs such as public health nurses, teachers, and other professional persons.

A broad new area that seems to be commanding a lot of attention is accident prevention, as exemplified by the special psychiatric project in Detroit, where persons who have second accidents involving drinking are required to have a psychiatric evaluation (12). In this way an effort is made to find the accident-prone or the severely disturbed persons, and a frightening number of people have been discovered who have really severe personality disorders.

We need to encourage the various agencies to take more and more responsibility for continuing all these projects. We are kidding ourselves if we think we can do the whole job. We can only serve as stimulators, collaborators, and helpers.

Any of the activities previously listed could also be initiated by a local agency or planning group. We have to consider the particular situation in any given State to determine whether such locally initiated services should be organized on a local, regional, or statewide basis. But wherever a project is set up and whoever initiates it, it does seem appropriate for the State agency to provide consultation in helping to define and clarify the problem which prompted the request for service. The extent to which we continue to help define the problem or engage actively in planning, organizing, and operating a project depends on the whole constellation of services that we are trying to carry out and the role we have assumed as a State agency.

Since we cannot cover the whole State with intensive services, we need to consider how best to undertake at least one or two demonstration projects in local areas. Before initiating such demonstrations, there must be a readiness in the community for the project and involvement of citizen leaders, and the project must have the potential for a long-term contribution to the broad objectives of the State program, as well

as to the immediate local situation. Such new projects may demonstrate a new kind of service, a new pattern of services, or a different application of existing services.

We think in the Texas program that probably the most important component of such a project is a built-in system of data recording for evaluation at the end of the project. Projects seem to require at least a full year of advance planning and, based on our experience during the last 4 years, at least 5 years of operation to accomplish lasting and convincing results.

In planning for a local project, staff must be adequate to meet the local demands for service, to handle community organization and interpretation activities, and to do the research work, including the project report. Such projects, we find, quickly generate more demands for service than the staff can handle, and it is extremely important to have sufficient staff, particularly persons assigned primarily to the research phases. The project might be aided either by a financial grant from the State agency or by lending a State agency staff member.

Policymaking, however, should be a function of a local representative group. We have used a written agreement in such projects, and have found it is valuable as a means of clearly defining the responsibilities of the two parties involved. If a community council exists, the new project should be developed by working in cooperation with and sometimes through it.

A staff development and training component is needed to develop the type of State community mental health program I have described. For many years most States have provided scholarships for the various mental health disciplines and have found this practice an effective method of recruitment. But as community mental health services move into untested kinds of program activities, the existing staff and the staff that is added as programs grow will need advanced training.

We think it is very important to work cooperatively with existing clinics and other psychiatric services and with universities and training centers to develop more training facilities within the State. If this is not feasible, regional agreements, similar to those developed by the Southern Regional Education Board,

mothers through maternity clinics and for mothers and children in well-child clinics. Frequently such services have been initiated locally or through the maternal and child health programs. But what is the responsibility of the State mental health agency for seeing that the potentials of these services are utilized throughout the State?

More adequate interagency services to disorganized families are seldom initiated locally or by another State agency. The studies of Community Research Associates in St. Paul, Minn., (10) and elsewhere indicate that a small proportion of families produce a great proportion of the behavior and personality disorders as well as other problems in a given community. Few would question the assertion that community health, welfare, and education agencies are not collaborating extensively in making comprehensive family diagnoses, for example, or in providing long-term, integrated services to such families. Should the State mental health agency initiate and help plan such collaboration? Perhaps the State agency should at least initiate local conferences or studies on the maximum use of mental health clinics by local agencies.

The State agency might also initiate an epidemiological study of the incidence of various kinds of mental illnesses. A very modest study (11) we did recently revealed that of first admissions to mental hospitals, almost half of the patients and their families had been known to one or more local agencies within a 3-year period immediately prior to hospitalization. Such a study can generate local projects in level 4 prevention which involve systematic interagency collaboration and stimulate the setting up of a system of psychiatric consultation and other supplementary services to the agencies serving these families. Such services would help the agencies to stabilize the family, prevent illness which would require hospital care, and perhaps result in long-time rehabilitation of some families.

A project we co-sponsored in a Dallas, Tex., general hospital assumed that if a family member has a psychiatric illness so acute as to require hospital care, his family also may be sufficiently disorganized to require considerable long-range health and welfare services. A de-

liberate effort was made to marshal the various community health and welfare services for the families of the patients who are admitted for psychiatric treatment. We hope to learn if the assumption is accurate and whether the marshaling of the services results in some demonstrable long-term rehabilitation or maintains the health of these families, or both.

We need to remind ourselves frequently that community mental health is not the exclusive property of our agency. And since many other State agencies and organizations are vitally interested in, and frequently initiate, mental health services, it seems important for us to develop and maintain good communication with them. Some of these are the crippled children's services; programs dealing with tuberculosis, chronic disease, alcoholism, venereal disease, and occupational health; State departments of education; State universities, especially extension divisions; medical and nursing schools; housing agencies; divisions of child welfare; vocational rehabilitation agencies; institutional services for the mentally ill and mentally retarded children; and mental health associations.

A State agency for community mental health might well collaborate with one or more other State agencies to strengthen services for children deprived of maternal care. State child welfare agencies usually have the responsibility for licensing children's institutions. Children in such institutions are definitely a population at risk for whom few State mental health programs are doing anything.

Another program might be to provide psychiatric consultation in crippled children's clinics. Public schools have a variety of mental health services, many of them initiated by State departments of education or by local school systems.

We have hardly scratched the surface in developing industrial mental health programs, yet there is currently a great deal of interest in mental health among occupational health people. Projects to prevent delinquency are started almost daily, and the State mental health agency should at least be informed about them. Other currently popular projects are community rehabilitation of the mentally ill, mental health services to the chronically ill, and counseling services for the aged. Activities



Inapparent Infection

Relation of Latent and Dormant Infections To Microbial Persistence

WALSH McDERMOTT, M.D.

BOTH microbes and man have an extraordinary degree of adaptive plasticity with reference to their respective environments. For centuries, man has been constantly changing his external environment and using his adaptive capacity to survive therein. In recent decades, however, man has greatly increased his capacity to alter his internal environment. And, it is man's now frequently altered internal environment to which the microbes that inhabit man must adapt if they are to survive.

When the Cornell University Medical College opened for the new term in the fall of 1958, I happened to draw the assignment of

Dr. McDermott, who is Livingston Farrand Professor of public health and preventive medicine at Cornell University Medical College, delivered the Dyer Lecture on December 16, 1958, at the National Institutes of Health, Public Health Service. A leading investigator in the field of infectious diseases, he has authored a large number of articles for scientific journals and contributed to medical classics on chemotherapy, pneumonia, and syphilis. He has also held posts of distinction on advisory and study panels of the Public Health Service.

discussing the first case at the clinical-pathological conference. The case record started off as follows:

A 43-year-old white Italian stock clerk was admitted to the New York Hospital-Cornell Medical Center for the first time June 4, 1957, complaining of swelling and tenderness of the right shoulder of 12 weeks' duration.

The patient was in good health until 3 months prior to admission when he noted the onset of swelling of the right arm from shoulder to wrist. This was shortly followed by fever and night sweats. Eight weeks prior to admission the right arm became painful. Shortly thereafter the skin over the right elbow became red and warm and the swelling increased. Despite initial improvement with corticotropin, steroids, and physical therapy, the discomfort in the right arm increased and admission was advised. A firm small right supraclavicular mass had been present for about 18 months. He had had an episode of "dry" pleurisy at age 21. One brother was known to have multiple cutaneous lipomata.

Physical examination revealed a well-developed, well-nourished white male who appeared neither acutely nor chronically ill. . . .

I shall omit the detailed presentation of the remainder of the findings in this case. I simply wish to call to your attention that the man was 43 years old, had considered himself to be per-

can be worked out. Whether the staff development program is on a State or regional basis, we must inaugurate it early or we shall find ourselves with insufficient staff or a staff that is not able to move forward into new program areas.

Yet even the best staff is on shaky ground in attempting its program planning alone. Some mechanism is essential to obtain the counsel and advice of both professional and citizen leaders in shaping broad program outlines. The staff will be kept closer to reality if there is a general advisory committee or a general committee and a technical committee.

Program Criteria

The following tentative criteria for a comprehensive, effective, and reasonable State program for community mental health are based on the foregoing assumptions, principles, and questions. As we become more experienced, the list should be critically reviewed and revised at regular intervals.

1. Are all four levels of prevention covered by some agency in the State if not by the State mental health agency?

2. Are existing services being developed with an attitude of experimentation, testing, and re-testing?

3. Are there areas of activity with both well-known and less well-recognized risk groups?

4. Is there a built-in evaluation component for all program activities?

5. Are program areas being planned and carried out in cooperation with other agencies to stimulate them to expand their own preventive activities in mental health?

6. Are at least some program areas of the State agency tangible, dramatic, and convincing?

7. Does the program encourage citizen as

well as professional participation in policy-making, at both the State and local levels?

8. Is the program's content timed both for current public concern and long-range needs of the State?

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New Water Pollution Control Division

A new Division of Water Pollution Control has been established in the Bureau of State Services, Public Health Service. Gordon E. McCallum, former chief of the Water Supply and Water Pollution Branch, Division of Sanitary Engineering Services, will head the new division.

diagnostic methods it was not possible to detect the presence of corynebacteria in the tissues of the rats. Yet the evidence was quite convincing that the corynebacteria in fact were there; it was just not possible to demonstrate that they were there. Once the rats received cortisone, this infection—that could not be introduced experimentally from the outside—exploded “from the inside,” so to speak, and formed a tissue-destroying and eventually fatal disease.

The question arises as to whether it was the presence of the latent corynebacterial infection or the absence of the appropriate tissue environment that created the host resistance against our attempts at experimental infection. In any case, once the cortisone influence was established, it was the corynebacteria, and not any of the other microbial species residing in the rats, that were resurrected to the production of destructive disease. Once again we may well inquire: Why *Corynebacterium*?

In this particular case we do have a little more of a lead from studies, some by LeMaistre and others and some by György and by Zucker and their associates in the precortisone era (2, 3). These studies have shown that certain specific dietary deficiencies can provide the appropriate environment for the resurrection of *Corynebacterium* in the tissues. In short, we have a glimpse here of the sort of specificity that we sense must be present in these microbial adaptations to their environment.

Retreat into Latency

The two examples cited thus far have been concerned with one end of a phenomenon: the apparent resurrection of a microbial slumberer that is then able to surpass its fellow competitors so successfully that it finally overcomes its host. Let us turn now to what might be viewed as the other end of the phenomenon, namely, how a microbe that is surrounded by a tissue environment wholly appropriate for its flowering as disease nevertheless assumes the latent state. How does the microbe that is living openly in the host “go underground?” Or, more precisely, can either the microbe or the ideal tissue environment be artificially modified so that microbial latency is the outcome?

An approach here that immediately comes to

mind is to modify the tissue environment by infiltrating it with one or more antimicrobial drugs. For the past 15 years or so our group at Cornell has been attempting to do just this. And, I can say that we have found only one situation in which it has been possible regularly to make an infection vanish from the tissues.

In all other situations with a variety of microbial species and a large number of antimicrobial drugs, the most that it has been possible to do is to keep an infection suppressed at very low but detectable levels in the tissues. The one exception has to do with tubercle bacilli of human origin and a derivative of the nicotinamide series known as pyrazinamide.

When tubercle bacilli subsisting in the tissues of the mouse are simultaneously exposed to pyrazinamide and another antituberculous drug for an appropriate period, all of the tubercle bacilli vanish from the tissues of the animals. By “vanish” is meant that the presence of tubercle bacilli in the animal tissues can no longer be demonstrated by the most elaborate techniques of microscopy, culture, or animal inoculation. The administration of pyrazinamide alone will likewise cause the tubercle bacilli to vanish if they have just previously been exposed to isoniazid for an appropriate period. When the pyrazinamide is administered entirely alone, that is, without either prior or concomitant administration of another drug, the vanishing phenomenon does not occur, and the effects of pyrazinamide seem to be of the same type as those of other antituberculous drugs, notably isoniazid. In the last-named circumstances, the populations of tubercle bacilli in the animal tissues steadily fall during the early weeks of chemotherapy and then stabilize at a low census at which they persist throughout many months of continued chemotherapy. These two phenomena, the vanishing of “drug-influenced” tubercle bacilli when exposed to pyrazinamide and the persistence of tubercle bacilli when exposed to isoniazid or to pyrazinamide alone, may be seen in figure 2, which depicts an experiment that has been repeated many times (4).

In actuality, the vanishing of the bacilli does not represent their complete elimination from the tissues of all the animals. When a 90-day period of pyrazinamide-isoniazid administra-

fectly well until 3 months previously, and on physical examination had appeared neither acutely nor chronically ill.

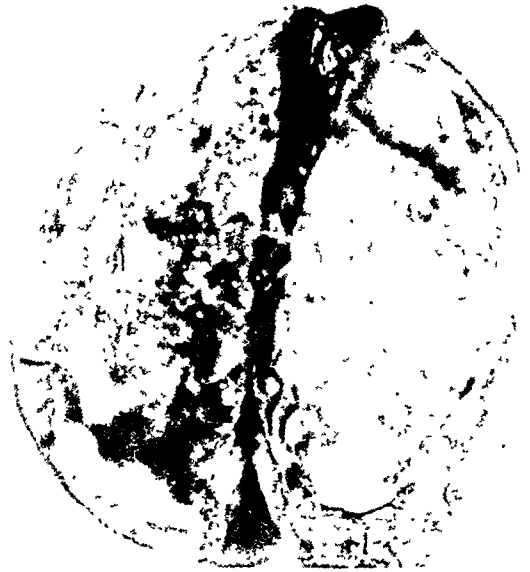
Revival of Microbial Slumberers

During the next 7 months this man had many trials and tribulations including such things as widespread tuberculosis of lymph nodes and lymphosarcoma. His multiple serious ailments were all brought under excellent control by the careful and wisely chosen application of some of the wonders of modern medical science. Indeed, he attained a symptom-free state and was able to leave the hospital for a short period. Nevertheless, this gallant patient and his most dedicated physicians were finally conquered by his developing an infection with *Monilia albicans*, a common microbe that characteristically lives harmlessly in man.

Presumably, when the patient was born he was not carrying *Monilia* but neither is there any reason to believe that he "caught" the monilial infection in the weeks preceding his death. In all probability, throughout most of his adult life the microbes of *Monilia* were living quietly somewhere in his tissues. This was presumably the case whether or not by our relatively crude diagnostic methods it would have been possible to detect them there amid the welter of other microbes for which he played the host. The point that concerns us is the fact that from this welter of other micro-organisms it was this particular one, *Monilia*, that found the environmental conditions for arising and conquering. In short: Why *Monilia*?

Let us turn now from the bedside to the laboratory and regard other examples of infection. Some 7 or 8 years ago, as was correctly fashionable at the time, we were engaged in our laboratory in studying the influence of cortisone and corticotropin on infections, notably experimental infections with tubercle bacilli.

In one part of these studies, LeMaistre and Tompsett chose a model consisting of avian tubercle bacilli and the rat, in order to have an infection that was generally mild in character (1). In figure 1 may be seen the type of caseating necrotic lesion observed in the lungs of the rats infected with avian tubercle bacilli and maintained on cortisone. The avian tu-



Reproduced with the permission of the Journal of Experimental Medicine, reference 1

Figure 1. Lesions of the lung of a rat which received cortisone but was not inoculated with tubercle bacilli.

bercle bacilli could be recovered by culture of these tissues.

The initial inference was the natural one that a characteristically mild tuberculous infection had been enhanced to the point of fulminating caseonecrotic disease by the influence of the cortisone. On more careful study, however, it was revealed that the avian tubercle bacilli had nothing to do with these caseonecrotic lesions. Instead, it was found that the entire process was a disease known as pseudotuberculosis produced by quite a different microbe, *Corynebacterium pseudotuberculosis muris*.

In the absence of cortisone, the members of the rat colony uniformly showed a high degree of natural resistance to the corynebacteria when attempts were made to infect them by various routes. For this and other reasons it seemed wholly improbable that the corynebacterial infection in the animals given cortisone represented a cross-infection occurring after the start of the cortisone. Despite careful and detailed investigation, however, it was not possible to demonstrate that the rats were already harboring the corynebacteria at the time they received the cortisone.

In other words, by the use of all available

light, digestive upsets, or menstruation. As techniques for tissue culture have been developed it has become clear that the cells employed are not infrequently the site of an inapparent infection. Another case in point is the activation of an inapparent viral infection of bacteria, a bacteriophage, by appropriate change in the environment, with resultant destruction of the bacteria. Thus it is becoming increasingly recognized that inapparent infection is a broad biological phenomenon involving all sorts of microbes and every sort of host including man, lower animals, plants, and even the microbes themselves.

In the present discussion no attempt will be made to cover this field throughout its entire breadth. Dubos has a recent publication on latent infection (5), and one of his associates, Dr. Harold Simon, has virtually completed a comprehensive review of the subject which is scheduled to appear as a monograph in the latter half of 1959. Consequently, in the following discussion, attention is limited to the phenomenon of inapparent infection as it applies to bacteria and fungi because here, with antimicrobial drugs, it is possible to manipulate inapparent infections and to draw certain relatively elementary inferences concerning their nature.

The Dormant State

Thus far, the discussion of inapparent infections has centered around latent infections. It seems to me that a latent infection can be regarded as an extreme form of microbial adaptation. For, inapparent infection can exist and eventually give rise to serious disease without the microbes ever having assumed a truly latent form. In a sense, this is merely semantics, but I have found it helpful to follow the practice of subdividing infections into those which are latent and those which are dormant.

The term "latent infection" is reserved for situations in which the presence of the microbes cannot be demonstrated by any method now available and the fact that infection is present can only be demonstrated in retrospect by the emergence of overt disease (usually as a relapse).

A dormant infection is one in which the presence of the microbes can be easily demonstrated

but they are not producing disease. In a dormant infection, the micro-organisms may be living openly as the so-called commensals in the respiratory or enteric flora or less obviously in the healed lesions of previous disease as in those of the tuberculin reactor and probably also the typhoid carrier.

As we view things today, the emergence from inapparent infection to openly progressive disease occurs far more frequently with dormant infections than it does with latent infections. This could change, however, and especially what could change are our techniques for detecting the presence of latent infections.

The Antimicrobial Drug

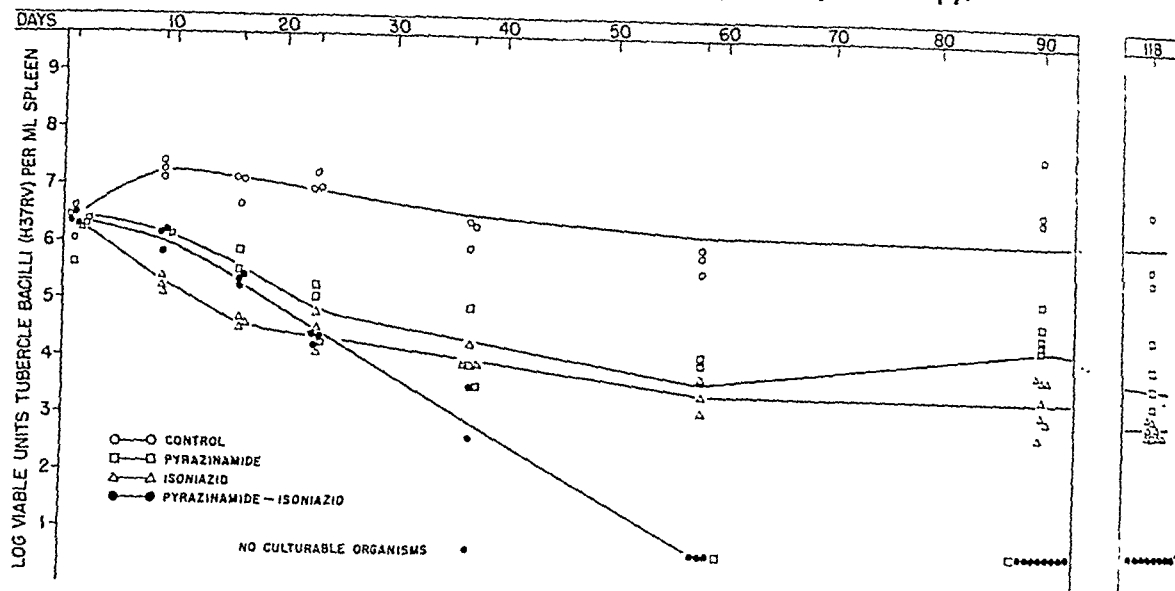
In attempting to analyze the phenomenon of microbial persistence it has seemed to me that there are five possibilities that merit consideration:

The first two are the possibilities that drug resistance of the genotypic form or inadequate drug dosage might be responsible. These can be dismissed from further consideration by virtue of the fact that experiments designed to test these possibilities have shown that they do not apply. Likewise a third possibility that microbial persistence is a result of a failure of the delivery of the drug to the parasite because of impenetrable barriers by abscess walls, fibrin membranes, or areas of necrosis can also be dismissed on the basis of appropriate experiments conducted both in our own laboratory and elsewhere.

One aspect of this barrier question does deserve special mention, however, and that is the effectiveness of intracellular residence as a sanctuary from drugs present in the intracellular fluid.

We are accustomed to hear the statement that such and such an antimicrobial drug "does not penetrate the monocyte" or some other type of cell. It is not generally realized that the type of experiment cited is not usually designed to measure whether the drug is or is not transferred across the cell boundary. Instead what is actually shown in most such experiments is that a particular microbial species, when situated within a cell, is less susceptible to a particular drug introduced into the extra-

Figure 2. Influence of pyrazinamide and isoniazid used singly and together on populations of tubercle bacilli in mouse spleens during 118 days of therapy.¹



Reproduced, with permission, from the *Journal of Experimental Medicine* 104: 767 (1956).

¹ Infecting inoculum: 2.0×10^6 culturable units of tubercle bacilli.

tion was followed by a 90-day treatment-free interval, the bacilli reappeared in approximately one-third of the animals. In these animals, therefore, a truly latent infection had been induced with spontaneous resurrection after a drug-free interval of 60 to 90 days. Whether the other animals that showed no microbial revival in the 90-day period of observation also had latent infection cannot be stated, but we believe it to be the case.

There are obvious parallels between this artificially induced latent infection with tubercle bacilli and the latent monilial and corynebacterial infections of the man and the rats. In all three cases there was a stage at which there is every reason to believe that the microbes were present in the tissues, yet not the slightest trace of their presence there could be detected. In all three cases the resurrection from the latent state did not occur until the tissue environment, the external environment of the microbe, had undergone some modification. With the corynebacterial infection of the rats, the change in the nature of the environment provided by the tissue represented some consequence of cortisone.

With the fatal monilial infection of the man, the nature of the environmental change in the tissues is not clear, but the various microbial species in natural competition with *Monilia* had been suppressed and cortisone had also been given. With the infection made latent artificially, the usual environment provided for the tubercle bacilli by the tissues of the mouse was obviously perfectly suitable for the full expression of the microbes. Consequently, for microbial resurrection no tissue modification was necessary other than to free the environment of the pyrazinamide.

The two examples of "naturally" occurring inapparent infection that have been chosen were simply those most readily at hand and represent the expression of the phenomenon by a fungus and by a bacterium. A familiar example of inapparent infection with a virus is provided by the commonplace happening of the breaking out of cold sores around the lips caused by resurrection of the virus of herpes simplex. In an infected person, this event will occur predictably when the environment provided for the virus by the tissues has been modified by such factors as fever, excessive sun-

of the microbe but might have to do exclusively with activities of its early youth, for example, cell-wall synthesis. In such a case, the newborn microbe might resemble a protoplast with its capacity to carry on metabolic functions including limited cell division but without the capacity to multiply freely (6, 22).

It is believed that the assumption of this state of drug indifference is induced or favored by the influence of the environment on the microbe. Included in these environmental influences are other antimicrobial drugs and intermicrobial relationships as well as the influences of the cellular and humoral defense reactions of the host and the reactions of inflammation. An environmental change of a particular sort may make the same parasite display widely different behavior to different drugs or may make different parasites display less than their maximal susceptibility to the same drug. For these reasons it is believed that it is the adaptive plasticity of the microbe that is the important factor in the influence of environment on drug effectiveness and not a chemical or physical antagonism exerted directly by the environment on the drug.

Expressed differently, pus does not neutralize drug activity, but in adapting to a necrotic environment a microbe may become less susceptible to a drug. Although instances of drug enhancement from environmental adaptation of the microbes do occur, thus far they have not been observed to lead to total eradication of a microbial population. Consequently, the net overall effect of the various environmental influences on drug effectiveness is in the direction of providing situations that favor microbial persistence.

Presumably this state, or these states, of drug indifference closely resemble, perhaps are identical to, the microbial states associated with latent or with dormant infections. Thus in concept, if not in actuality, microbial persistence may be regarded as merely the induction of the latent or the dormant microbial state by drugs.

The Parasite's Morphological Changes

Consideration of the phenomenon of microbes in the latent or in the dormant state naturally gives rise to speculation on the possible nature of such states. This is particu-

larly the case with the latent state because the question immediately arises as to the form that could be assumed by the tubercle bacilli or the corynebacteria so that they might be able to exist in the tissues without our being able to find them.

In the first place, it must be recognized that our methods for microbial detection are so relatively crude that the microbes need not change their form in order to "vanish" completely. All that would be necessary would be for the microbes to lose the ability to grow on our artificial culture media. A population of tubercle bacilli, for example, must be quite large before it is readily detectable by direct microscopy so that if it had lost its ability to adapt to artificial media, it would be undetectable.

In recent years the concept that microbes might possibly exist in more than one form has become respectable, almost fashionable. Moreover, with full realization that our inability to detect microbes during latency may simply reflect the crudity of our diagnostic methods, there remain, nevertheless, certain features of latency that suggest a major change in the form of the microbe.

The principal feature has to do with the time sequences involved in the pyrazinamide-induced latent tuberculous infection. For the uniform induction of latency, a total period of 12 weeks of chemotherapy was required. The pyrazinamide and companion drug could be administered together for the entire 12-week period or 4 weeks of treatment with isoniazid followed by 8 weeks of pyrazinamide could also suffice. But variations of these time-dose relationships, keeping the 12-week period constant, would not suffice. For example, merely reversing the order in which the two drugs were given in the sequential experiments or reducing the initial isoniazid therapy to 2 weeks instead of 4 weeks would result in a failure to induce latency. Obviously, a number of inferences are possible from these observations, but the relative precision of the time-dose requirements suggests the operation of some process that requires considerable time.

The resurrection of the tubercle bacilli from the latent state likewise required a considerable period. It must be remembered moreover, that the tissue environment in which the resurrec-

cellular environment than is the case when both the microbe and the drug are allowed to come together outside the cell.

In short what one observes is that microbes within cells are less drug susceptible than microbes outside cells; what one *infers* is that the drug was not transferred into the cell.

In reality, in the few cases in which the actual transfer of a drug has been measured, such as in Eagle's careful studies with isotopically labeled penicillin at the National Institutes of Health (7), it is found that quite substantial quantities of drug are transferred. Indeed, the quantities of penicillin transferred are more than sufficient to exert full effectiveness, so when the intracellular microbes are not fully susceptible, and sometimes they are not, some other explanation must be found.

From Eagle's studies on penicillin transfer and from some observations on penicillin-staphylococcus-leucocyte systems by Tompsett (8), it does not appear that the persistence of a minority of the intracellular staphylococci is due to a failure in drug delivery. Instead, the persistence within the phagocyte seems to be merely a replica in miniature of microbial persistence in the body as a whole.

The fourth possibility is that the environment of the inflammatory lesion exerts an antagonistic influence on the activity of the antimicrobial drug.

Although in the past I have done as much as anyone to promulgate this concept, I no longer believe it will stand up to critical scrutiny (9). It is easy to show that environmental changes result in changes in drug effectiveness. This is particularly striking in the fact that the same microbial species situated in the different organs of the same animal show widely different susceptibility to the same drug. For example, tubercle bacilli in the lung of the mouse are far more susceptible to isoniazid than tubercle bacilli in the spleen. Moreover, tubercle bacilli in the spleen are far less susceptible to streptomycin than the staphylococci in the spleen of the same animal species.

When tested in conventional circumstances *in vitro*, tubercle bacilli are quite unaffected by pyrazinamide. When the environment of the bacilli is altered, however, either by making it

more acidic or by situating the bacilli within monocytes, tubercle bacilli of human (but not bovine) origin become highly susceptible to pyrazinamide. A recent report by Williamson (10) shows that a change from an anaerobic to an aerobic environment doubles the effectiveness of dihydrostreptomycin on *Escherichia coli* over a wide range of pH. By contrast, with *Aerobacter aerogenes*, the enhanced drug activity in the aerobic environment occurs only at pH 7 or above. Since in both sets of circumstances the drug is the same, the effect of the environmental change on drug influence must be something directly related to the parasite and not a direct environmental antagonism of the drug.

Thus a number of examples exist wherein a change in environment has been accompanied by a change in drug effectiveness. In each case, however, the result could equally well have represented an influence of the environment on the parasite. Some of the examples of environmental influence, moreover, represent influences that could only have been exerted on the parasite. In view of these considerations together with the fact that a large excess of drug should usually be present in the lesion, it appears that environmental antagonisms of drug activity may well occur, but that seldom, if ever, should it attain a magnitude that would provide a satisfactory explanation for the phenomenon of microbial persistence.

The State of Drug Indifference

The fifth possibility is the one that in my opinion fits the evidence. In brief, the concept is that microbial persistence is the result of the ability of microbial populations to assume a state in which they are neither permanently incapacitated by a drug nor do they multiply freely in its presence as do the genetically drug-resistant microbes.

I have designated this state, which can be demonstrated *in vitro* and *in vivo*, as "drug indifference."

The concept of drug indifference does not imply marked suppression of all metabolic functions of a microbe but merely those related to a particular drug. The metabolic functions do not necessarily continue throughout the life

environmental change by assuming quite a different form and that this may occur within the animal body. It is of interest that the corynebacteria and mycobacteria involved in the two latent infections I have been using as illustrations are included in the list of organisms that can assume a protoplast-like form. Moreover, it is especially relevant to the present discussion to note that for some microbial species protoplast formation can be regularly induced by appropriate exposure to penicillin. The protoplasts so induced are not destroyed by penicillin, and when the penicillin is removed from the environment the protoplasts revert to the vegetative (and penicillin-susceptible) form of the microbe.

Obviously, it would be intriguing to attempt to study the pyrazinamide-tubercle bacillus relationship from the standpoint of protoplast formation especially in view of the long period necessary for microbial resurrection in the tissues.

As mentioned previously, however, we must keep constantly in mind the fact that our detection techniques for the customary forms of bacteria are so relatively crude that nonculturable but morphologically typical microbes could survive undetected in the tissues.

It might well be questioned whether there is any value in attempting to divide inapparent infections into those which are dormant and those which are latent on so artificial a basis as the ability or inability to detect the infective agent at a particular point in time. As long as this contrivance does not make us prisoners of our thinking, I believe it serves a useful purpose at this time when our knowledge is so elementary. For, the distinction keeps open the prospect that in a latent infection the microbe may be structurally and functionally in a state quite different from the microbe of overt disease or the carrier state. Along with this goes the corollary possibility that in the phenomenon of resurrection from latency to overt disease, the activation of complicated mechanisms within the parasite may be as essential as the appropriate changes in the environment provided by the host. By contrast, with a dormant infection all that may be necessary is a lapse in host defenses for the infection to become disease.

Microbial Persistence

Let us return now to consideration of experimentally induced latent and dormant infections in laboratory animals. As you will recall it was emphasized that the vanishing of the drug-influenced tubercle bacilli when they were subsequently or concurrently exposed to pyrazinamide in the tissues represented the only instance in our experience in which a microbe became truly latent as a consequence of chemotherapy. This experience includes studies with staphylococci, streptococci, *Klebsiella*, and *Brucella* as well as tubercle bacilli, and it includes all of the available antimicrobial drugs. In the case of tubercle bacilli alone, some 13 drugs with demonstrable antituberculous activity have been studied when administered singly and in various multiple drug regimens. With two compounds, a thioamide of nicotinic acid and streptovaricin, results approaching those of the pyrazinamide phenomenon were noted, but true latency could never be produced with uniformity throughout all the animals studied.

Obviously, tubercle bacilli possess the equipment to assume the latent state, but the process apparently has to be invoked in some highly specific way. Some notion of the degree of specificity that must be involved may be seen from the fact that this capacity of human tubercle bacilli to respond to pyrazinamide by assuming latency is not shared by the very closely related tubercle bacilli of bovine origin. At least one other microbe, *Treponema pallidum*, probably possesses the capacity to assume the latent state both in rabbits and man as a result of drug exposure. This point cannot be established with certainty, however, because of our lack of culture techniques whereby the tissues could be subjected to reasonably searching scrutiny to show the nondetectability of the treponemas during a latent state.

In contrast with the rarity of drug-induced latent infections, the production of dormant infections occurs regularly with all microbes studied when exposed in the tissues to an appropriate antimicrobial drug. Indeed in the experiments with latent tuberculous infections, dormant infections were produced in the groups of animals that received isoniazid or pyrazinamide as single drug therapy (fig. 2). In each case, the populations of tubercle bacilli fell

tion occurs is presumably quite favorable for the proliferation of the tubercle bacilli. Yet in the animals in which the bacilli reappear after a 90-day treatment-free interval, it has not been possible to demonstrate their presence at the 30-day or the 60-day observation point. Even when sufficient cortisone is given to evoke other microbes during the first 30 days after therapy, no resurgence of the tubercle bacilli has been demonstrated.

This appreciable delay in the reappearance of the tubercle bacilli in an apparently favorable environment and our inability as yet to hasten the process by artificial "stresses" suggest that a significant modification of the parasite was necessary before resurrection could occur. In other words, the time relations suggest that the microbial adaptation represented by the latent state of tubercle bacilli is not something that is rapidly responsive to transient fluctuations in the status of the host defenses. By contrast, resurrection of tubercle bacilli from the dormant state can occur with rapidity. The speed with which resurrection from the latent state (as contrasted with awakening from the dormant state) occurs might vary considerably among the microbial species and might likewise depend, to some extent, on the rapidity with which the appropriate environmental alterations could be accomplished.

What could be the nature of a morphological change that might accompany the physiological state of latency? Certain studies of this general subject of the existence of other forms of well-known microbes have employed antimicrobial drugs, notably penicillin, to induce the novel microbial forms. This was the case with the minute colonial forms of staphylococci, the so-called dwarf forms, and more recently with the studies of L-forms and bacterial protoplasts.

When the outer, rigid wall of a bacterial cell is removed under appropriate conditions (or its synthesis prevented), the bacterial cytoplasm and its cytoplasmic membrane may continue to exist. This surviving unit is known as the protoplast. The protoplast can carry on many, perhaps all, of the metabolic functions of the original cell except cell-wall synthesis.

It is the process of cell-wall synthesis that

appears to represent the site of action of penicillin and the protoplasts of penicillin-susceptible microbes are unaffected by penicillin. The protoplasts also appear to possess the capacity to multiply but to what extent such newborn protoplasts can survive is not yet established. These minute "peeled grapes," so-to-speak, are quite fragile and are especially susceptible to oxygen and to changes in the osmolarity of the environment.

There is some reason to believe that all protoplasts from the same microbial species are not alike. Consequently, Weibull, who is one of the outstanding investigators in this field, believes it is valuable to distinguish between true protoplasts in which no trace of the outer cell wall remains, and "protoplasts" or protoplast-like structures to which some fragment of a cell wall may remain (11). Weibull regards true protoplast formation as being something that has been clearly demonstrated for only a few microbial species and the protoplast-like phenomenon as being something more common.

In any case, the literature today contains a number of reports of observed "protoplast" formation among such micro-organisms as staphylococci, tubercle bacilli, enterococci, and many others. Moreover, a number of workers have come to regard the process of protoplast formation as being identical with what happens in the first stage of the formation of the L-form from the normal vegetative form of certain bacteria.

Despite their fragility, protoplasts can survive in vitro with appropriate manipulations of the environment. Moreover, if L-forms are protoplasts or protoplast-like structures, they would represent one form that survives in vitro where indeed the osmotic homeostasis might be expected to be more protective.

Wittler and associates in Washington have shown that the L-form of corynebacteria can be converted to the familiar vegetative form in HeLa cells by appropriate changes in the environment of the host cells (12). Wittler has also shown the same phenomenon for *Haemophilus pertussis* in mouse tissues (13).

Thus there is accumulating quite a respectable body of evidence to the effect that many microbial species are capable of responding to

crobes in a dormant infection have the capacity to assume different morphological states. In contrast with a latent infection, however, there is in a dormant infection no delay or difficulty in cultivating the microbes in their orthodox form.

Before leaving this question of possible morphological changes in the parasite in the tissues, I should like to make a brief comment on the matter of the role of the host in maintaining an infection in the dormant or the latent state. Presumably, the host plays an important role here both through the known host mechanisms of defense, by similar mechanisms as yet unrevealed, and by not providing certain types of environment such as those produced in the tissues during starvation or in the cortisone-treated animal. What I would like to point out, however, is that in quite properly focusing our attention on the host in the host-parasite reaction we have tended to regard the parasite as something that is passive and relatively constant in nature whether it is actively producing disease or living quietly in the tissues. In so doing we have tended to regard the difference between the latent and the active stages of an infection as depending almost entirely on the momentary status of the host defenses and have been neglecting the wide range of individual expression possessed by the parasite. It seems quite likely that evocation of an infection from the latent state might require some rather substantial adaptive changes by the parasite and not merely a failure of some defense mechanisms of the host. The difference between a dormant infection such as an arrested tuberculous lesion in the lung and a latent infection such as syphilis might hinge on this very point: that for resurrection to disease, the latter would require changes in the microbe itself.

Point of Drug Susceptibility

While considering the role of the host in maintaining an infection in the dormant or latent state it is also appropriate to consider to what extent antimicrobial therapy can exert an influence in this respect. The question might be phrased by inquiring whether microbes that are not actively producing disease are likely to be drug susceptible. A fair amount of information is available on this point. The

information is derived both from laboratory studies and from five clinical situations in which it has been possible to observe the effects of drug therapy administered in the early hours after the moment of infection. In all five clinical examples (syphilis, malaria, scrub typhus, tuberculosis, Q fever), the antimicrobial therapy was not eradicated, but simply held the situation frozen, so-to-speak, for as long as its administration was continued.

The observations on these various diseases suggest that there exists a stage to which the host-parasite reaction must mature before the infection is fully drug susceptible as measured by post-treatment relapse (9). In the Tigertt-Benenson studies of Q fever it was shown that this particular stage of maturity is not necessarily so old as the stage of evolution to the full clinical illness (14). When the treatment was started before this stage, however, it was clearly ineffective and served only to produce a slight prolongation of the incubation period of the clinical illness.

From these five clinical examples (6-9) and especially the two that were conducted experimentally by Smadel and Woodward and their associates (15) and by Tigertt and Benenson, it is clear that the phenomenon of drug indifference or microbial persistence can be present from the very beginning of an infection. Even at the earliest stages of an infection when the untreated microbial population is presumably at its lowest census, the introduction of antimicrobial therapy is by no means totally eradicated. In these circumstances, moreover, it is important to note that microbial persistence can occur without evoking the host-immune response characteristic of that particular infection. As a practical matter it makes no real difference whether certain microbes in an infecting population are drug indifferent at the time of implantation or whether the whole process of conversion to drug indifference occurs after infection has been accomplished and drug therapy started. In either case drug indifference can be present in the early moments of infection, and this fact is obviously of crucial importance with respect to chemoprophylaxis.

Many factors are presumably involved in the successful transmission of one or more microbes from one host to another, and the actual physi-

sharply after the start of drug therapy but then stabilized at a low census at which they remained throughout the many weeks of continued therapy.

As mentioned previously, this survival of the microbes in the tissues at a constant low census despite appropriate drug therapy can be shown for a number of microbial species and all available antimicrobial drugs. Indeed this phenomenon, which I like to designate microbial persistence, represents a biological property of very broad but perhaps not unlimited generality. In the treatment of infections in humans, the existence of the phenomenon of microbial persistence need not necessarily lead to therapeutic failure but most failures that occur stem from it. Moreover, in addition to providing the basis for post-treatment relapse, microbial persistence is obviously responsible for the post-treatment carrier state. In short, it is this phenomenon which is responsible for our inability to eradicate an infection uniformly from a group of patients or from a community by the use of drugs.

Our group at Cornell has been specially preoccupied with this phenomenon of microbial persistence ever since early 1946. An extensive review of these studies has been published recently (6). Accordingly, I shall attempt to present the subject only in sufficient outline to provide a proper basis for a subsequent consideration of latent and dormant infections. In so doing it will be necessary to employ bold assertions at certain points without bringing forward the experimental evidence that has seemed to me to be convincing. This evidence is offered in the published presentation.

In this brief consideration of microbial persistence, we start from the demonstration both in patients and in laboratory animals that microbes that are drug susceptible in the orthodox sense are nevertheless able to survive in the tissues despite the prolonged administration of the appropriate antimicrobial therapy. The horizontal trend lines of the census of microbes during therapy seen in figure 2 are merely one graphic representation of this point. Indeed, about the only situations in which antimicrobial therapy can be totally eradicated in humans are with the relatively fragile *Neisseria* and possibly also with dysentery bacilli.

The close resemblance of the microbial states of drug indifference to those of the naturally occurring latent and dormant infections may be seen in the phenomenon of drug-resistant "persisters." It is quite clear that the general phenomenon of microbial persistence is not a result of the presence or emergence of genotypically drug-resistant microbes. Indeed with the experimental model employed in figure 2, when a microbial population is resistant to a particular drug the census in the tissues does not fall on administration of the drug. Moreover, when the population is drug susceptible at the beginning but is transformed in the course of therapy to one that is drug resistant, the drug-induced downward trend of the census is reversed and the microbes proliferate freely in spite of the continued administration of the drug. But sometimes this microbial resurgence does not occur. Instead the population that has been markedly reduced by drug therapy (and is now predominantly drug resistant) simply remains at the low census throughout long periods of continued drug therapy. In short, the drug-resistant microbes behave like drug-susceptible persisters.

Unfortunately, it has not been possible to conduct the obvious experiments on the fate of these drug-resistant persisters in the period after the antimicrobial therapy has been discontinued. It is possible, however, that the situation here may resemble the paradoxical situation discussed below in connection with chemoprophylaxis in which a microbial population that is drug indifferent is nevertheless under the continued influence of the drug. What can be said at this point about the resistant persisters, however, is that microbial populations (including the drug-resistant cells) obviously can become dormant or latent within an animal body by processes not necessarily dependent on antimicrobial therapy.

The possible morphological changes in the microbe to go along with the altered metabolic states have been considered in terms of latent rather than dormant infections. The latent state appears to represent a more extreme form of microbial adaptation than the dormant state, and hence it is to the latent state that attention is understandably directed. Obviously, it cannot be stated at this time whether the mi-

crobes in a dormant infection have the capacity to assume different morphological states. In contrast with a latent infection, however, there is in a dormant infection no delay or difficulty in cultivating the microbes in their orthodox form.

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Many factors are presumably involved in the successful transmission of one or more microbes from one host to another, and the actual physi-

cal transfer of an infecting population to a new host is not necessarily followed by their successful maintenance there. The presence of a prophylactically administered drug in the fluids of the new host might well make the difference between the success or the failure of the implanted microbes to survive. What must be recognized, however, is that even if an antimicrobial drug is present in the tissue fluids at the time of the initial microbial seeding there is no reason to doubt that some of the microbes may survive as persisters. Consequently, the possibility seems highly likely that chemoprophylaxis—to the extent that it is employed to try to prevent actual infection—will only be uniformly successful with the very few highly fragile microbes, such as gonococci, meningococci, or dysentery bacilli, that appear to have little capacity to survive as persisters.

Although the premature drug therapy was ultimately unsuccessful in the five examples cited, it was clear that the infections were suppressed as long as the antimicrobial therapy was continued. This implies that the microbial populations were both drug indifferent and drug influenced at the same time. Presumably, what happens in this apparently paradoxical situation is that a significant proportion of the microbial population is in fact drug indifferent and remains so. But as the tissue environment contains antimicrobial drug, whenever individual microbes revert from drug indifference to a state of drug susceptibility or new cells are born into this state they are promptly inhibited by the drug. As a result the population as a whole is kept constantly suppressed, a condition I like to describe as being in a state of physiological imprisonment.

In the clinical instances cited, the physiologically imprisoned microbes were able to resurge to the point of producing clinical illness once the antimicrobial drug was removed from the tissue environment. It is conceivable that if the physiological imprisonment were maintained for a sufficiently long period, the microbial populations might die off completely in some cases and in others assume a latent or dormant state that would continue even in the absence of drug. Presumably something akin to the last-named possibility occurs in the puzzling case of drug-resistant persisters.

It would hardly be proper, in a discussion of inapparent infection, to fail to note the possibility that latent or dormant infections, either natural or drug associated, are capable of damaging the tissues by their continued presence there. This is the sort of speculative exercise that can rapidly get out of hand. Nevertheless, it seems appropriate to mention a few diseases, associated with microbial infection, in which demonstration of the indicted microbe in the tissues in its recognizable form has either never been accomplished or has been accomplished only rarely. The two principal diseases in this category are syphilis and rheumatic fever. Sarcoidosis might possibly represent a third example, but the indirect association of these lesions with tubercle bacilli is considerably less definite than the indirect association of rheumatic carditis with streptococci or tabes dorsalis with *T. pallidum*.

The fact that tabes dorsalis is caused by *T. pallidum* is generally accepted, yet the presence of the spirochete in the lesions has never been convincingly demonstrated. To some extent this situation is not comparable with that of other infections because no method exists whereby *T. pallidum* can be cultured. Nevertheless, *T. pallidum* can be demonstrated by microscopy of stained tissue in certain other lesions of syphilis, notably parenchymal disease of the brain and in the lungs and liver of syphilitic newborn. In the pre-penicillin era, the lesions of tabes dorsalis were generally considered to represent the sterile end result of a previous involvement with *T. pallidum*. It came as a considerable surprise, therefore, to note clinical improvement in the so-called "lightning pains" of tabes dorsalis when afflicted patients were treated with penicillin. To be sure, evaluation of improvement in "lightning pains" is notoriously difficult, but long-experienced clinicians were convinced that penicillin influenced them. Thus an antimicrobial drug appears to exert its influence in lesions that hitherto were not considered to contain microbes. As noted above, however, the possibility remains that the lesions of tabes dorsalis represent an active syphilitic process, and it is merely our inability to cultivate *T. pallidum* that makes the situation seem at all unusual.

The lesions of rheumatic carditis are not gen-

erally believed to represent a direct tissue reaction to the presence of streptococci but some type of unusual host reaction to previous streptococcal infection elsewhere in the body. Moreover, on microscopic examination of the lesions of an acute rheumatic carditis, streptococci are not to be seen. Nevertheless, reports recur of the successful cultivation of streptococci from the acute lesions of acute rheumatic carditis in patients who have died during the acute stage of the disease (16-19). These reports have been made by knowledgeable people who have presented their findings with great diffidence. In today's climate of opinion, however, the general tendency with respect to the observations has simply been to look the other way. In experiments in rabbits, however, Denny and Thomas have shown that group A streptococci could persist in the tissues for many weeks and could then be evoked to the stage of bacteremia by the administration of cortisone (20). Whether, prior to evocation, they were dealing with a dormant or truly latent infection cannot be stated because the experiments were not designed for the specific study at this point.

Thus, with all due respect to the many more widespread beliefs concerning the relationships of *T. pallidum* to tabes dorsalis and streptococci to rheumatic fever, the possibility that these microbes in dormant or latent form are actually present in the respective lesions cannot be excluded.

Our Contemporary Challenge

What is the magnitude of the problem we face today with respect to this resurrection of infections from the inapparent state to the state of progressive disease? It is quite clear that the problem is a formidable one and by its very nature is bound to become even more so in the future. Indeed, it is not always appreciated that in the economically developed countries today it is these endogenous infections that constitute virtually the entire load of illness caused by all forms of microbial disease except those caused by viruses. In short, on an individual basis today, but on one that is bound to steadily widen, man is beginning to succumb to his own microbes.

All that is necessary to see this is to enter an adult ward of a general hospital any morning and inquire what problems are present that day with respect to infection. This is an experience that I happen to have every 6 weeks as part of our teaching program, and it is most illuminating. Certain points immediately become evident. First, a surprisingly important portion of the disease load on a general hospital ward on any one day is still caused by microbial infection. Second, no one microbial species or genus is particularly involved but rather the disease load is caused by a relatively wide assortment of microbes. Third, despite the heterogenicity, these disease-producing microbes have one outstanding characteristic in common: they all form what is customarily regarded as the normal microbial flora of man.

Thus the microbes causing the greater portion of our morbidity in hospitalized patients today are the familiar microbial species that through the years we have grown accustomed to regard without fear. On any one day the disease assortment will include infections produced by *E. coli*, *A. aerogenes*, *Proteus*, *Pseudomonas*, nonhemolytic streptococci, and *M. pneumoniae*. Two other microbes, staphylococci and tubercle bacilli, likewise deserve inclusion on the ground that although they are capable of producing disease they commonly inhabit our bodies without doing so. Approximately one-half of any group of adults are carriers of potentially pathogenic staphylococci. With tubercle bacilli the situation depends on one's age. It is estimated that 40 percent of the population of the United States over the age of 30 are harboring living tubercle bacilli so that in effect both tubercle bacilli and staphylococci can be considered to be part of man's normal microbial flora.

All of these microbes have the capacity to survive for long periods in man without causing either benefit or harm insofar as can be detected by today's methods. But when man's internal environment is suitably altered, as is so often the case today, all of these microbes have the capacity to arise and produce serious illness.

The ways whereby man's internal environment is subject to alteration today are familiar to us all and represent the unsought portion of the consequences of our great therapeutic

advances. In ever-enlarging measure these advances are making it possible for us to permit the survival of the socially desirable but biologically unfit. This sociobiological force is not limited in its impact to infancy and childhood but is operative to a considerable extent at all ages of life. As a consequence there are many more of us who consider ourselves to be in "good health" but who have some defect with respect to our ability to make our own adaptation to the microbes around us. The defect may be in our structure or in our experience.

Even those of us who were structurally sound to begin with and who have not been overly protected against life's microbial experiences may rapidly lose our veteran status if we have to give up certain of our tissues to the surgeons or of necessity must be saturated with certain hormones. When man's internal environment was modified by politically induced states of extreme deprivation, such as in a Nazi concentration camp, the disease produced was largely microbial and was caused by the more prominent of the microbes that inhabit man (21). When crudely comparable states of deprivation are produced today by long-continued corticosteroid administration, the results are the same. And, if we accompany the tissue deprivation by a drug-induced suppression of the more prominent microbes, we get disease by the less prominent microbes such as *Monilia*.

We have been relatively slow in recognizing the importance of this problem of endogenous infection today. One part of it we seem to have almost suddenly discovered, namely, the hospital infections due to staphylococci. But we are slow in recognizing that important as staphylococci are—and I have no desire to minimize their importance—they represent, nevertheless, only a part of what is a considerably larger contemporary problem. Indeed, in terms of serious or fatal microbial disease in our adult hospital services, the intestinal bacilli and the fungi are usually even greater offenders than staphylococci. We are also too prompt to attribute successful microbial survival in this drug-ridden world to the phenomenon of genotypic drug resistance. It is not so much that drug-resistant staphylococci or the drug-resist-

ant members of other microbial genera are not important today as it is that they represent only one of the many ways whereby microbes can successfully adapt to the changes around them. The serious illness and death due to microbial disease today are not chiefly a result of once-susceptible microbes that have now become drug resistant. Instead, to an increasing extent, these diseases are being caused by microbes that never were susceptible to our drugs but hitherto have managed to persist in an inconspicuous fashion in our tissues.

As we have seen, not only does man lack the power to create life but his ability to destroy it, at least at the microbial level, is sharply limited. To the extent that this means that microbial adaptability will continue to blunt our attempts at therapy and prophylaxis, the situation might be regarded as being somewhat gloomy. But to the extent that what holds for the microbes holds for us as well, any restriction on man's ability to exterminate life has its good side too.

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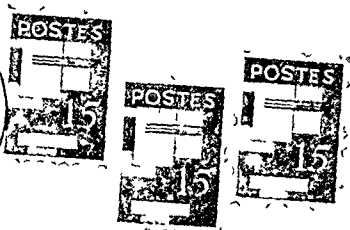
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Antibiotic Use for Preserving Fish

The use of an antibiotic to aid in keeping fresh-caught fish in sound condition was authorized for the first time by the Food and Drug Administration in an order, effective April 21, 1959, which sets a safe limit on the amount that may remain on such food without harm to the consumer.

The order allows commercial fishermen to use the antibiotic, chlortetracycline, on fresh-caught whole, headed, and gutted fish, shucked scallops, and unpeeled shrimp. Its use is not permitted on processed seafood products, including fish cuts, steaks, and fillets, peeled shrimp, and shucked oysters. Chlortetracycline has been used on poultry since 1955 and extensive data on its safety are available.

The maximum amount that may remain on the seafood has been fixed at 5 parts per million. This quantity will not always be removed in cooking, but the agency has determined that it may be consumed without harm even by persons sensitive to antibiotics. Treated seafood products must be labeled to show that they contain the antibiotic and that it has a preservative effect.



Malaria surveillance field teams in Thailand expect to protect 5 million people each month in house-to-house visits. For this full-scale program, a report form for rapid analysis by electronic computers has been developed.

Village surveillance records are summarized for each canton, an administrative grouping of about 10 villages. The canton surveillance summary reports, about 1,000 a month, require analysis for location, population, control operations, workload, fever cases, treatment, and malaria by age groups. A report from the north

A report from the northern region explained that the first cycle of the program will probably take 4 months to complete, because time is needed to improve the procedure and many employees are new to the work. Also the shortage of bicycles has meant that men must travel on foot over trails between scattered villages that cannot be reached by jeep. However, Thai officers and men treat the program as a personal challenge and are working enthusiastically to see it through.

water were the only items consumed by people who were affected. The rice had boiled and nothing had been added to it. I expected the water which came from the river checked the alum used to clarify it. Then I discovered that the last family we interviewed got water from a nearby pond and did not use alum. Meanwhile a sanitarian, questioning the families independently, found that some of those who had been ill had eaten a rice cake called pitha. We questioned all the families again; everyone who had been ill had eaten pitha.

Analysis of the rice cake showed the salt ingredient contained sodium nitrite. We learned that the woman who made the cake had asked a driver to get salt for her. He had a package of salt in the bus and handed it to her. She remembered as she prepared pitha that day, that the rice turned red.

—MOHAMMED FAHIMUDDIN, M.D., *director public health, East Pakistan, and* GLENN S. USH M.D., *special assistant for medical activities, Communicable Disease Center, Public Health Service, and co-leader, epidemic aid team to East Pakistan, May-July 1958.*

Occupational medicine and rural hygiene are combined in the research work carried on by the State Institute of Rural Occupational Medicine and Rural Hygiene in Lublin, Poland. Prof. Dr. Józef Parnas is director of the institute and Prof. Dr. F. Wysocka is its scientific secretary.

The institute's origins are connected to Prof. Dr. Witold Chodźko, Poland's first minister of health and a member of the sanitary organizations of the League of Nations, who helped to set up the nation's first health stations in 1905.

Since the institute was established in 1951, it has conducted laboratory and field research on the effects of chemicals on agricultural workers, the working conditions of drivers of farm machinery, rural housing, and the personal hygiene and prevalence of parasites in the rural population. It has dealt with outbreaks of tularemia, Q fever, leptospirosis, toxoplasmosis, and brucellosis; and has trained rural surgeons and workers for sanitary and epidemiological stations.

By the time we reached Tarabou, a village near Dacca, East Pakistan, to investigate a report of sudden fatal illnesses, 6 children had died and 8 other people had been ill. A 20-year-old woman had the same symptoms as the younger victims, cyanosis, restlessness, abdominal pain, and signs of circulatory collapse. We learned that the children, whose ages ranged from 1 to 6 years, had died within half an hour after they became ill. The others had recovered in 3 to 5 hours and had no apparent residual effects. A chemical poison seemed to be the most likely cause of the illnesses.

The detailed food histories showed that rice and

The newer phenolic and vinyl base paints present less of a health hazard from lead intoxication than oil base paint, according to this study which investigates the effect of a number of variables on lead solubility.

Laboratory Study of the Solubility of Red Lead Paint in Water

D. A. FRASER, M.S., and L. T. FAIRHALL, Ph.D.

CONCERN increases over the amount of lead taken into the body as it becomes more and more apparent from analyses of food, air, and water that each of these contributes a quantity of lead each day. The maximal non-cumulative daily body burden of lead has been determined to be approximately 0.5 mg. Lead intake from sources other than water approaches this permissible maximum. If it is found that any one of the three sources contributes an undue share of lead, efforts should be made to identify that source and suggest a remedy.

In view of the extensive industrial use of red lead and red lead paints and the hygienic significance of lead compounds, it is remarkable that so very little is known about the solubility of these materials in water. According to Friend (1), red lead is "practically insoluble in water." The only value we have found in

the literature is one theoretically derived by Glasstone (2) from electrode potential measurements. Glasstone measured the electrode potential of the half element $\text{Pt} \left[\begin{smallmatrix} \text{Pb}_3\text{O}_4 \\ \text{PbO} \end{smallmatrix} \right]$ against the standard mercury-mercurous oxide electrode using identical solutions of carbonate-free-N-sodium hydroxide throughout. The value obtained of -0.610 is very slightly higher than the theoretical potential of -0.617 volt. Assuming the ionization of red lead to be $\text{Pb}_3\text{O}_4 \rightleftharpoons 2 \text{Pb}^{++} + \text{PbO}_4^{--}$ the solubility of red lead in N-NaOH is 1.1×10^{-17} gram-mol per liter at 17°C .

Our study was undertaken to determine experimentally the solubility of red lead and the extent of dissolution of lead by water in contact with surfaces coated with red lead paint. Three types of red lead paint were tested: linseed oil base, phenolic base, and vinyl base. Specifications of these paints are given on p. 502. It should be noted that the oil base paint used did not contain the added litharge found in present-day specifications. Several lots of oil base paint, some ground commercially and some in the laboratory, were studied. In a supplementary experiment the three types of red lead paint were exposed to the solvating action of natural and treated waters from eight localities in the United States.

Since the data were obtained in the laboratory

Mr. Fraser, a chemist, is with the Occupational Health Branch, Division of Special Health Services, Public Health Service, at Field Headquarters in Cincinnati, Ohio. Dr. Fairhall, formerly with the branch, is deceased. Dr. Herbert E. Stokinger, chief toxicologist of the branch, and the staff of the Division of Sanitary Engineering Services provided many helpful suggestions in the critical review of the manuscript. (Manuscript received for publication February 9, 1959.)

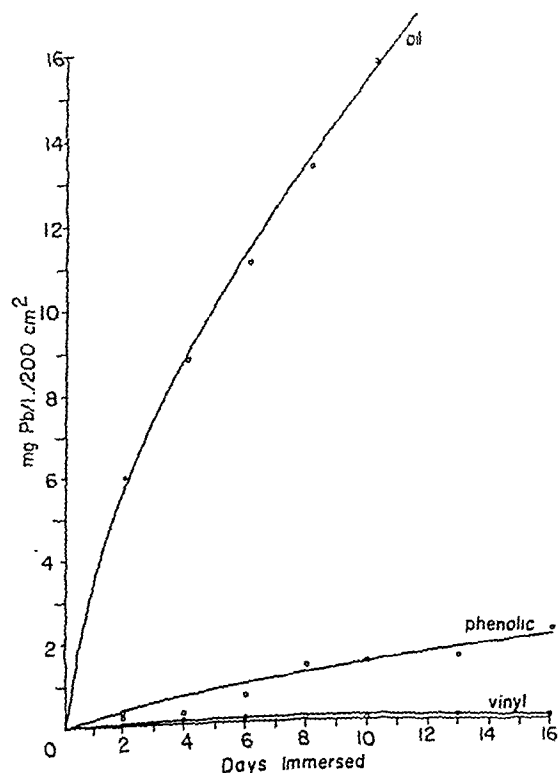
and selected variables affecting the solubility of lead were studied separately, the study does not apply to all variables, acting in combination, that may be encountered in the field. For a valid toxicological appraisal of the amounts of lead in water, samples taken from tanks actually in use with various types of water would have to be analyzed.

Red Lead Powder

The chemical procedures for determining the amount of lead taken up by water in contact with red lead may be interfered with by (a) the particle size of the red lead, (b) the colloidal tendency and penetration through filtering media, and (c) adsorption of lead by the filtering medium.

Measurements of the particle size of the samples of red lead powder showed an average of 0.8 micron (μ), with a range from 1.3μ to the lower limit of visibility of the optical micro-

Figure 1. Dissolution of lead from red lead paint in contact with distilled water.



NOTE: Drying time for oil base paint: 80 days.

Specifications and Formulas for Paints Tested

Oil Base

From Federal Standard Stock Catalog, Section IV, Part 5. Federal Specification for Paint; Red Lead Base, Ready Mixed, TT-P-86a (May 4, 1949), type I.

Component	Percent by weight
Red lead (Fed. Spec. TT-R-191, type I, grade C)-----	77.53
Aluminum stearate (Navy Spec. 52 A 12)-----	.23
Raw linseed oil (Fed. Spec. TT-O-369)-----	10.90
Pale heat-bodied linseed oil (Navy Spec. 52020)-----	3.78
Mineral spirits (Fed. Spec. TT-T-291, grade 1)-----	6.45
Liquid drier (Fed. Spec. TT-D-651, type I)-----	1.11
	100.00

Phenolic Base

From Federal Standard Stock Catalog, Section IV, Part 5: Federal Specification for Paint: Red Lead Base, Ready Mixed, TT-P-86a (May 4, 1949), type IV.

Component	Percent by weight
Red lead (TT-R-191, type I, grade C)-----	55.99
Magnesium silicate (TT-M-90)-----	4.36
Diatomaceous silica (52-MC-522, type I)---	5.25
Aluminum stearate (52 A 12)-----	.26
Phenolic varnish-----	25.35
Aromatic petroleum spirits (TT-N-97, type II)-----	7.60
Diptene (TT-D-376)-----	.94
Lead naphthenate (24 percent Pb)-----	.08
Cobalt naphthenate (6 percent Co)-----	.02
Manganese naphthenate (6 percent Mn)-----	.02
Antiskinning agent (National Aniline ASA)---	.13
	100.00

Vinyl Base

No Federal specification available. Red lead vinyl resin paint, supplied by National Lead Co., Brooklyn, N.Y.

Component	Percent by weight
Red lead (TT-R-191, type I, grade C)-----	23.70
Aluminum stearate-----	.10
Vinyl resin—VAGH-----	16.35
Tricresyl phosphate-----	1.64
Toluene-----	25.31
Methyl isobutyl ketone-----	25.31
Carbitol (low gravity)-----	7.59
	100.00

scope, about 0.5μ . A suspension showed active Brownian movement, and the colloidal aggregates precluded filtration through even the best grade filter paper. A certain amount of colloidal lead invariably penetrated the filter, as shown by the Tyndall effect, with resultant erroneously high values.

The adsorption of lead on the filter paper causes erroneously low values. O'Shea (3), who first demonstrated the adsorption of lead by filter paper, showed that filtration of dilute lead acetate solution resulted in a loss of approximately 0.2 mg. of lead in 50 cc. of solution. Preliminary experiments in this study showed that filter paper adsorbed lead from neutral solution to such an extent that three filtrations of an optically clear solution of 1 mg. of lead salt per liter of water removed 99 percent of the lead.

Ordinary filtration procedure was therefore excluded, and pressure filtration through cellophane with the Zsigmondy type of apparatus was resorted to. When wettable cellophane, designated as 600-PUT-O, was used as the filtering medium under a pressure of 150 kg./cm.²

Figure 2. Effect of drying time on dissolution of lead from oil base red lead paint.

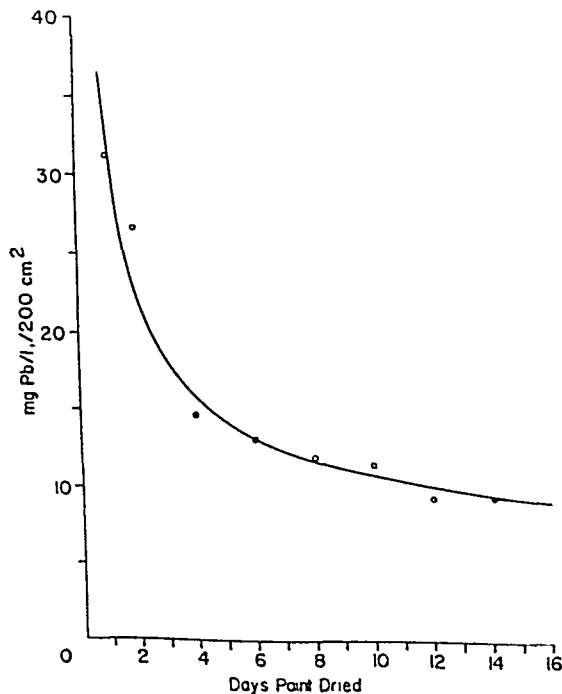
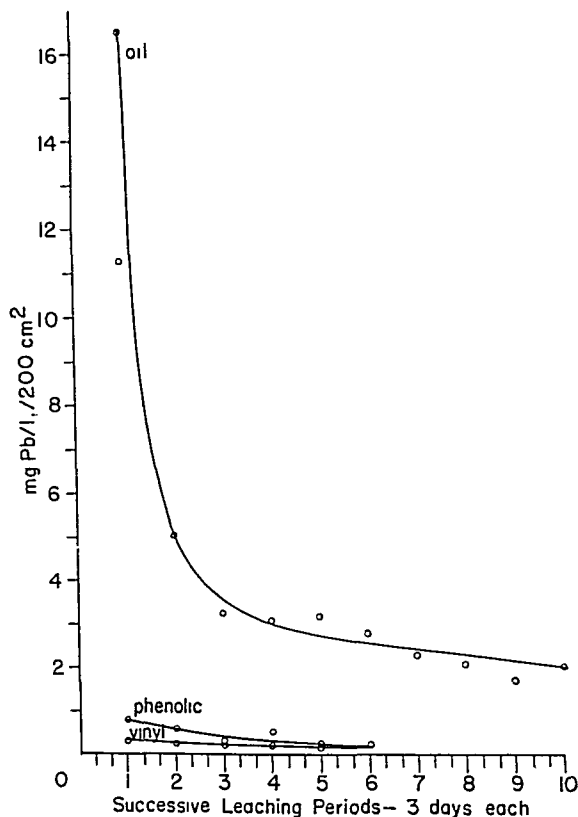


Figure 3. Effect of successive leaching of red lead paint film with water.



NOTE: Drying time for oil base paint: 10 days.

of nitrogen gas, no detectable lead loss occurred and the filtrates were optically clear.

Suspensions of red lead in distilled water were shaken in Pyrex bottles until equilibrium was reached. The lead content of the pressure-filtered solutions was determined by the chromate method of Fairhall and Keenan (4). This analytical method was chosen because, being a titration method, it is applicable over a wide range of concentrations without dilution of the sample or other extrapolation of results.

Because of probable contamination of red lead with the more soluble lead monoxide, reagent-quality red lead was purified by Glass-tone's method by repeated treatment with sodium hydroxide (1), and then washed with dilute acetic acid. The successive portions were analyzed for lead until constant values were obtained.

Purified reagent grade red lead powder gave an average value in distilled water at room tem-

perature of 5.53×10^{-4} gram of lead per liter (0.553 ppm) or 8.9×10^{-7} gram-mol of Pb_3O_4 per liter. Suspensions of red lead in distilled water gave only a slightly greater amount of lead in true solution after standing for 1 year.

Red Lead Paint

The investigation of red lead paint was concerned solely with the lead in solution. Particulate lead oxide or particles of lead paint film resulting from blisters or pinholes and mechanically swept into suspension, while hygienically important, were completely removed, and the results in all cases refer only to lead in true solution.

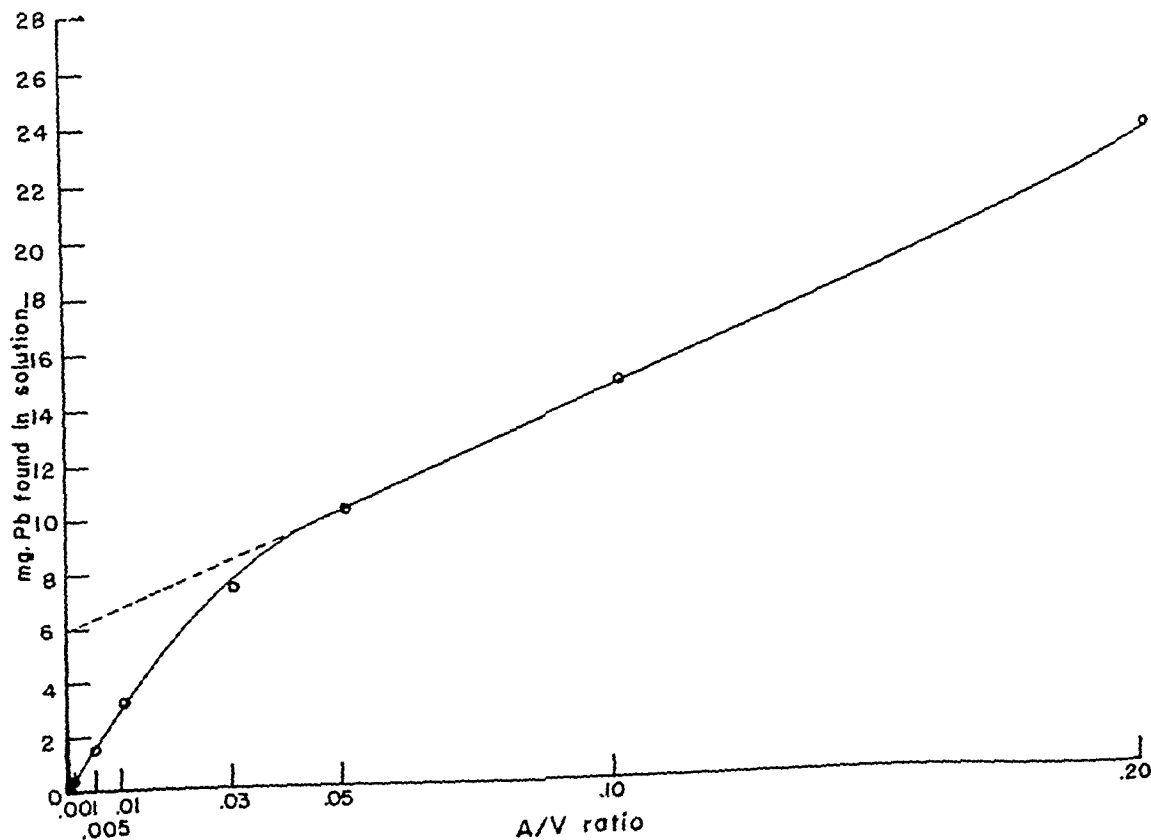
Although the effect of water alone was of primary interest, the effects on lead solubility of sodium hydroxide, sodium hexametaphosphate, free chlorine, and differences in alkalinity and acidity were also studied.

For most of the tests the paint was applied

to glass surfaces. Glass was used so that the results would reflect the solution tendency of the paint film itself rather than the effect of possible interaction of the paint film and metal surfaces. Several dozen glass plates were cut to measure 3 inches by 6 inches from stock 0.3 cm. thick. Areas of 100 cm.² were measured and marked off on each plate. The plates were washed, cleaned with nitric acid and distilled water, dried, and painted to the desired area, and the paint film was allowed to dry for appropriate periods. In studying the oil base paint, various drying times were tested. The drying time of the phenolic and vinyl base paints was less important, since drying consists principally in evaporation of the solvents (5).

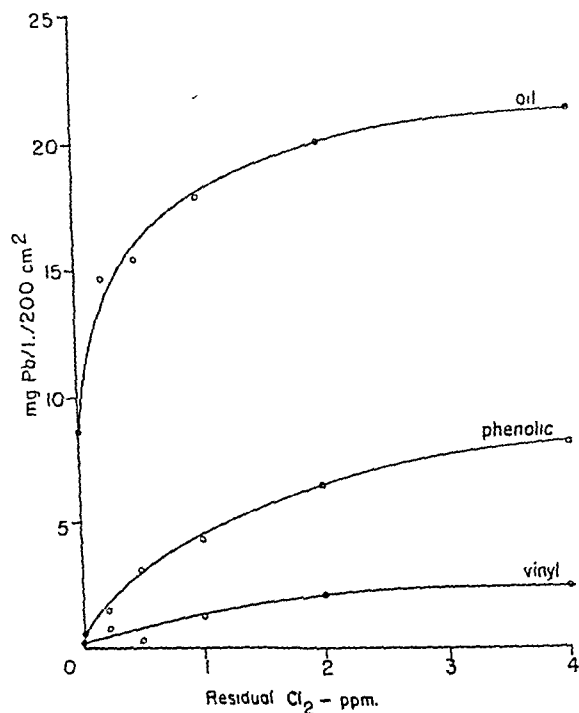
Water solubility tests were also made for lead from the three paints on black iron and on galvanized iron plates. The red lead paint was applied directly to the iron plates or over an undercoating of zinc-chromate primer.

Figure 4. The amount of lead in solution plotted against the area/volume ratio (cm.²/cm.³).



NOTE: Data for oil base paint, with drying time of 7 days and immersion time of 3 days.

Figure 5. Effect of chlorination of water on dissolution of lead from red lead paint.



NOTE: Drying time for oil base paint: 94 days. Immersion time: 3 days.

When the primer was used, the red lead paint was followed by a coat of aluminum paint.

The painted plates, both glass and metal, were placed in tall form 1-liter beakers, and 500 ml. of either distilled water or the desired salt solution was added. The beakers were sealed with sheet Parafilm and allowed to stand at room temperature for the desired time. The plates were then removed, rinsed with distilled water, and the water was analyzed for lead by the chromate method (4).

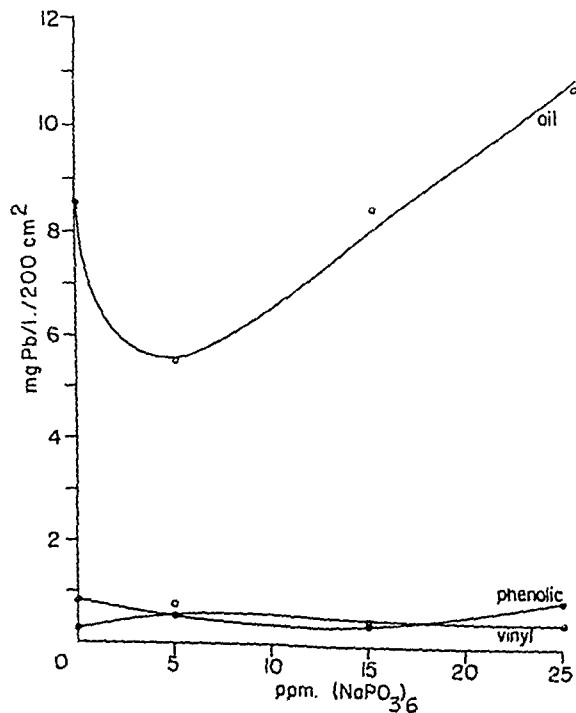
Finally, an experiment was performed in which successively smaller areas were painted with the oil base paint and dried for 7 days. These glass plates were immersed in successively greater volumes of water. After immersion for 30 days the water was drained off and tested for dissolved lead by the more sensitive dithizone method (6). This procedure permitted an investigation of the range of area/volume ratios from the experimentally determined ratios to those that might be encountered in the field.

In the supplementary investigation the three types of red lead paint were exposed to natural water. To determine the effect of variations in natural water on the solution of lead, samples of the treated city water supplies from eight localities in the United States were obtained. Areas measuring 100 cm.² on glass plates were painted with the red lead paint, and the plates were immersed in 500 ml. of each of the water samples for 30 days after the paint had dried for 7 days. The water was then analyzed for lead content by the chromate method (4).

The results of all experiments are expressed in milligrams of lead dissolved per liter of water for exposure surface of paint film of 200 cm.² In all experiments except the area/volume ratio study, the area/volume ratio was 100 cm.²/500 ml., or 1 cm.² of surface per 5 ml. of solution.

Immersion time. The results of the immersion-time experiment show clearly that the oil base paint yields increasing amounts of lead with continued exposure (fig. 1). After 10

Figure 6. Effect of sodium hexametaphosphate on dissolution of lead from red lead paint.



NOTE: Drying time for oil base paint: 97 days. Immersion time: 3 days.

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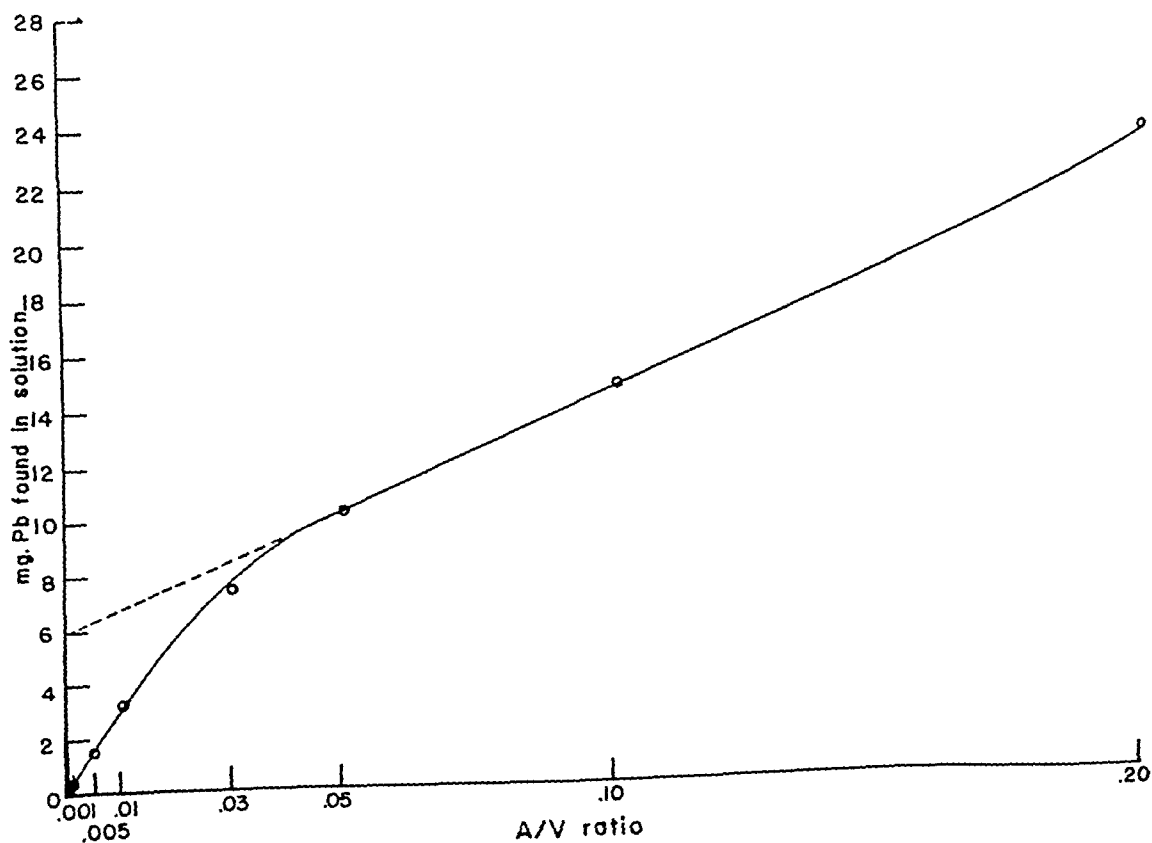
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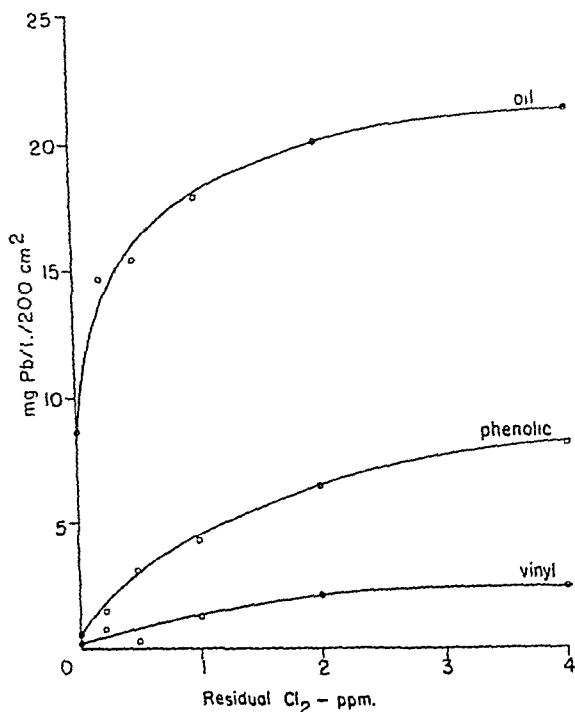
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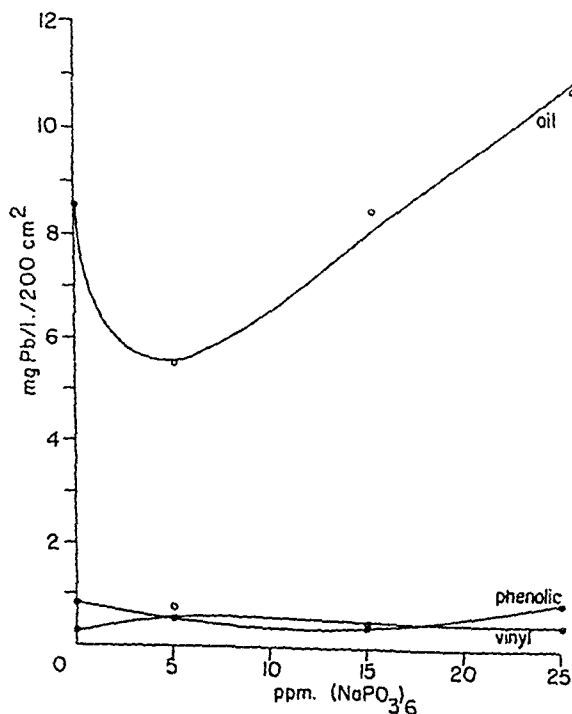
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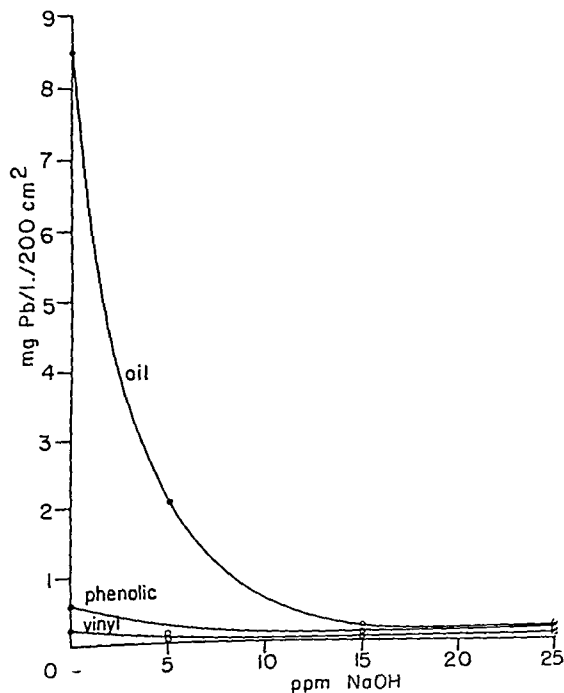
NOTE: Drying time for oil base paint: 97 days. Immersion time: 3 days.

days' immersion, the lead content of the test water was 15.8 mg. per liter. Furthermore, the oil base paint yields more lead in water than either of the other two paints. The highest value for the phenolic base paint was 2.32 mg. The highest for the vinyl base paint, which yielded the least amount of lead of any of the paints, was 0.13 mg.

Drying time. For the oil base paint, increasing the drying time from 1 day to 2 weeks appreciably decreased the release of lead, from 31.24 mg. to 9.30 mg. after 3 days' immersion time (fig. 2). Drying beyond the 2-week period caused a further slight reduction. However, an average value of 7.44 mg. per liter of water was obtained after 80 days of drying. Since the drying of the phenolic and vinyl paints consists largely in evaporation of solvent rather than the complicated chemical reactions which occur in the drying of linseed oil base lead paint, no particular change in the amount of lead in solution would be anticipated, and none was observed.

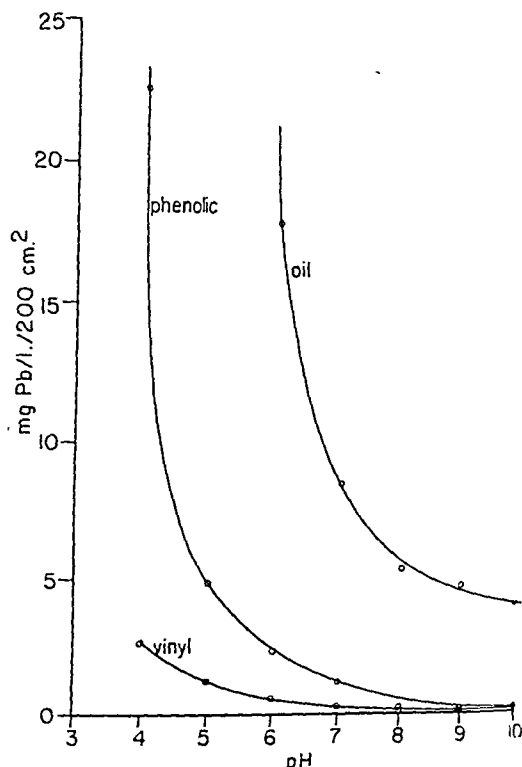
Repeated immersion. Repeated immersions,

Figure 7. Effect of sodium hydroxide on dissolution of lead from red lead paint.



NOTE: Drying time for oil base paint: 97 days. Immersion time: 3 days.

Figure 8. Effect of variation in hydrogen ion concentration on dissolution of lead from red lead paint.



NOTE: Drying time for oil base paint: 14 days. Immersion time: 3 days.

each lasting 3 days, resulted, for the oil base paint, in a decided decrease from the first high value of 16.50 mg. of lead per liter of water until a nearly constant value of 2 mg. was obtained after the 10th immersion (fig. 3). A slight decrease was also noted for the phenolic and vinyl paints, but the initial solubility was much less. The decrease was from 0.81 to 0.21 mg. of lead per liter with the former and from 0.28 to 0.19 mg. with the latter.

Area/volume ratio. As the area/volume ratio (cm^2/cm^3) decreases from 0.2 to 0.05, a straight line relationship holds (fig. 4). A further decrease results in values which lie considerably below those predicted by an extension of the straight portion of the curve.

Residual chlorine. Because public water supplies generally are chlorinated, the effect of residual chlorine on red lead was studied. With all three types of paint, lead solvency was increased by the presence of 0.0–0.2 ppm of

residual chlorine, the normal range of chlorination. With higher residual chlorine concentrations there was a further increase to a constant maximum. With the oil base paint the amount of lead dissolved in 3 days increased from a value of 8.54 mg. per liter per 200 cm.² in chlorine-free water to 14.54 mg. at a chlorine value of 0.2 ppm. Phenolic base paint under the same conditions increased from 0.59 to 1.62 mg., while vinyl base paint increased from 0.24 to 0.85 mg. (fig. 5).

Sodium hexametaphosphate. Addition to the water of low concentrations of sodium hexametaphosphate, another chemical often used in treating public water supplies, caused depression in the solubility of lead during an immersion period of 3 days (fig. 6). This effect has been noted previously by Ruchhoft and Kachmar (7) with reference to other lead salts. The solvent action of sodium hexametaphosphate was apparent only at relatively high concentrations (25 ppm). At the concentrations investigated this salt had little or no solvent effect on vinyl base red lead paint.

Sodium hydroxide. With increasing amounts of sodium hydroxide (up to 25 ppm) the amount of lead carried into solution decreased, for all three types of paint (fig. 7). With the oil base paint there was a decrease from 8.54 mg. after 3 days' immersion in distilled water to 0.23 mg. following immersion for the same period in water containing 25 ppm of NaOH.

Hydrogen-ion concentration. Variation in

pH from 4.0 to 10.0 indicated that water on the acid side of neutral has a greater solvent effect on paint film than does water on the alkaline side (fig. 8). Sodium acetate buffer with either acetic acid or sodium hydroxide was used to cover this entire range. The solution was made as weak as possible, consistent with obtaining buffering capacity, in order to limit the effect of the acetate ion and to record only the effect of the hydrogen-ion concentration. Immersion time was 3 days, and the oil base paint film was dried for 14 days prior to testing.

With all three paints, pronounced solubility of the red lead occurs at a pH of 4. The solubility value for oil base paint increased from 8.44 to 117.2 mg. per liter per 200 cm.² at this pH; for phenolic base paint it rose from 1.21 to 22.4 mg.; and for vinyl base paint, from 0.31 to 2.71 mg.

Nature of surface. Whereas most of the foregoing work was based on paint films on glass, further studies were made, as noted above, of red lead painted plates of black iron, galvanized iron, and iron plates with a priming coat of zinc chromate conditioner. When the iron plates were completely covered with red lead paint, the results were similar to those obtained with glass plates. The values were somewhat lower when the red lead paint blistered, formed pinholes, or became detached in any way so that the more basic metal was in contact with the solution. It was assumed that such decrease was due to the replacement of Pb ions by the metal higher in the E.M.F. series. Unpainted

Table 1. Characteristics of water in eight localities: Results of analyses supplied by local water departments

Locality	pH	Parts per million											
		Total solids	Na and K	HCO ₃	SO ₄	Cl	NO ₃	Hardness as CaCO ₃	Mg	Ca	Fe	SiO ₂	F
Amarillo, Tex.-----	7.90	400	29	326	36	14	2.7	263	39	41	0.02	70	3.7
El Paso, Tex.-----	8.20	634	162	24	265	121	.4	196	19	34	.06	13	.8
Jacksonville, Fla.---	7.95	381	13	150	150	20	.01	290	32	70	.06	23	(1)
Cleveland, Ohio.-----	7.60	159	5.6	113	25	11	(1)	120	8.4	35	.07	(1)	(1)
Boston, Mass.-----	6.65	28	3.2	7	6	2.1	.22	15	.7	3	.02	3.7	(1)
Catskill, N.Y.-----	7.30	28	1.7	11	8	1.0	.49	20	1.2	4.5	.01	2.6	(1)
Croton-on-the-Hudson, N.Y.-----	7.45	69	2.9	41	11	2.6	.88	51	4.2	12	.05	9.6	(1)
Seattle, Wash.-----	7.50	49	3.6	28	6	1.2	.2	21	1.4	6.7	.02	13	(1)

¹ Not reported.

iron plates placed in the same beaker with glass plates coated with oil base red lead paint caused a reduction in values for the glass plates of 3.4 mg. in a test period of 7 days.

Further experiments with unpainted iron plates in a very dilute solution of lead acetate caused a drop in concentration from 9.56 mg. to 1.31 mg. of lead per 500 cc. Plates painted with vinyl base paint followed by an overcoating of aluminum paint yielded as much as 0.114 mg. of lead per liter.

Water samples. For the tests of the effect of water from city supplies, samples were obtained from localities differing widely with regard to such factors as fluorides, hardness, total solids, and pH value. The normal water data given in table 1 are average results supplied by the water departments of the various cities and are not necessarily the exact mineral content of the samples used. All water samples were tested for lead by the dithizone method before use, and no lead was found.

In the experiment with oil base paint, the amount of lead found in solution after immersion for 30 days varied from 28.9 mg. per liter for water from Amarillo, Tex., to 3.62 mg. per liter for water from Seattle, Wash. The effect of the various types of water tested on the phenolic and vinyl base paints was equally variable (table 2).

Discussion

Whereas red lead purified by Glasstone's method gives somewhat lower values than those obtained with the commercial product, the value obtained by direct measurement is greater than the theoretical figure arrived at by electrode potential measurement. An explanation of the low results which Glasstone calculated from such measurements may exist in the fact that these measurements were made in N-NaOH (40,000 ppm). Our results show that sodium hydroxide decreases the solubility of red lead within the range investigated (fig. 7). It is possible that this may hold also for higher concentrations of sodium hydroxide.

Particularly interesting in our study are the results regarding the effect of pH and certain substances on the rate of dissolution of lead. Pertinent data are summarized in table 2.

Table 2. Dissolution of lead from red lead paint on glass plates immersed for 30 days in water from eight localities

Locality	Milligrams of lead per liter of water per 200 cm. ²		
	Oil base paint	Phenolic base paint	Vinyl base paint
Amarillo, Tex.-----	28.9	0.31	0.17
El Paso, Tex.-----	27.8	.27	.03
Jacksonville, Fla.-----	18.2	.11	.18
Cleveland, Ohio-----	5.80	.31	.38
Boston, Mass-----	5.54	1.30	1.09
Catskill, N.Y.-----	4.07	.53	.25
Croton-on-the-Hudson, N.Y.-----	3.62	.60	.15
Seattle, Wash.-----	3.62	.60	.58

They show clearly the increased rate of solution of lead during the test period in the presence of residual chlorine or at low pH.

It had been anticipated that the protective oxidized oil film, coating the particles of red lead and resulting from the drying of oil base paint, would tend to reduce the solvent action of water. Of outstanding interest, therefore, is the finding in this study of a greater amount of lead in solution following contact with red lead oil base paint in comparison with the amount resulting from red lead powder suspended in water. Thus, the theory that a protective film retards the solution of red lead is not tenable in this case.

Table 3. Solubility of red lead paint according to type of water

Type of water	Milligrams of lead per liter per 200 cm. ²		
	Oil base paint (14-day dry)	Phenolic base paint	Vinyl base paint
Distilled-----	7.4	0.3	0.2
pH 6-----	16.5	2.4	.6
pH 7-----	7.4	1.2	.3
pH 8-----	4.8	.1	.1
Cl ₂ (1 ppm)-----	17.5	4.0	.5
NaOH (5 ppm)-----	2.0	.2	.1
(NaPO ₃) ₆ (5 ppm)-----	5.5	.6	.8

NOTE: Drying times for oil base paint corrected for ease of comparison. Immersion time: 3 days.

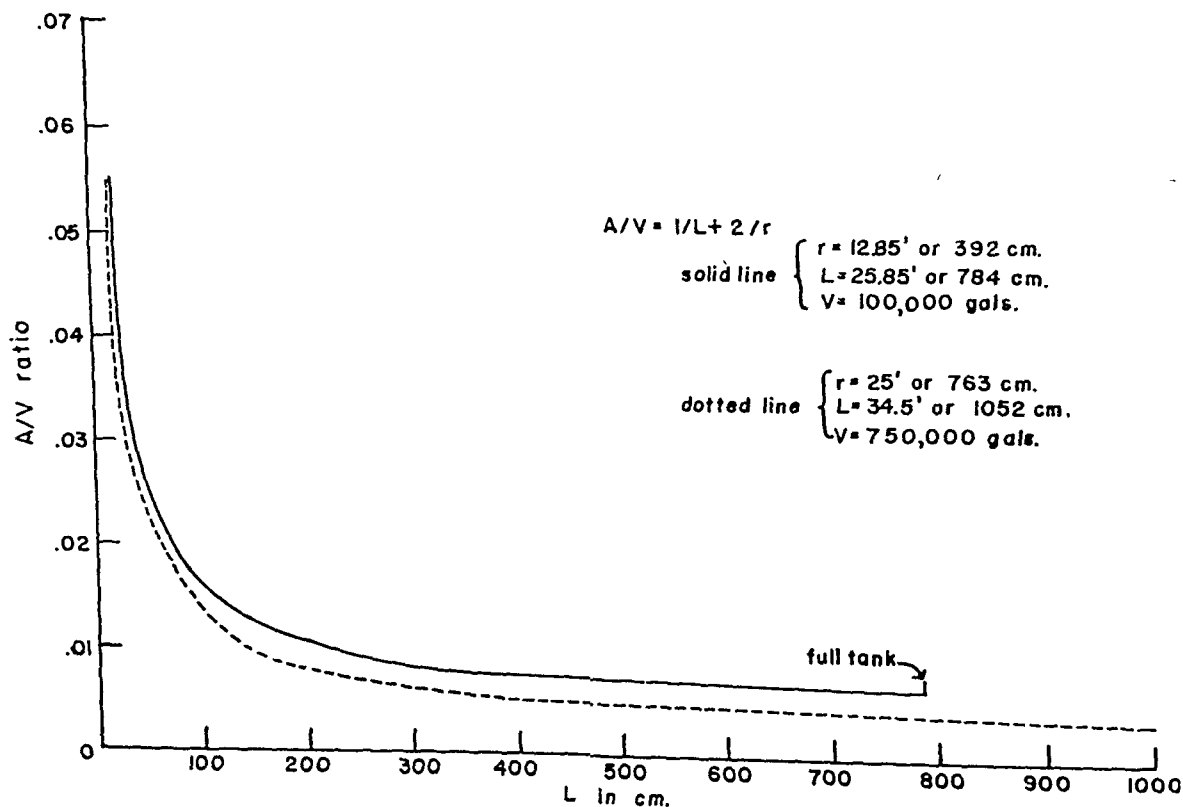
An explanation for this result is found in the effect of linseed oil on red lead itself. Red lead in contact with linseed oil results in the formation of either a small amount of lead soap, presumably lead linoleate, or a glyceride of lead (8-10). A preparation of the lead salt of the fatty acids of linseed oil exhibited solution properties similar to and values higher than the oil base film itself.

Although no figures for lead linoleate are given in the literature, values (calculated) for lead palmitate, lead myristate, lead stearate, and lead laurate (11) vary from 21.2 mg. of lead per liter of water to 46 mg. The value for the solubility of lead linoleate prepared from linseed oil used in the paint experiments in our investigation was 41.1 mg. of lead per liter of water. It is understandable, therefore, that appreciable amounts of the lead salt would leach out of this type of paint film in contact with water.

The effect of repeated leaching should provide a clue as to whether or not this was merely a surface effect yielding a relatively high initial concentration of lead, which tended to wash off and lessen in amount. The results obtained with the three types of paint exhibit such an effect. However, for the oil base paint the uptake of lead after 30 days of successive immersion approaches a nearly constant value of 2 mg. per liter per 200 cm.² of painted surface.

When the values shown in figure 3 are summed and compared with those of figure 1, it is found that, if the area of painted surface is kept constant while the volume of water is increased, the dissolution of lead from the paint surface is constant and independent of the volume. Therefore, the concentration of lead found in solution varies directly as the ratio of the area of paint to the volume of water. That this straight line relationship does not hold throughout the entire lower range of the area/

Figure 9. Area/volume ratios (cm.²/cm.³) attained in two cylindrical tanks of different dimensions as water level is increased.



NOTE: L=water height; r=tank radius.

volume ratio is shown by figure 4. The decrease in the amount of lead found at lower area/volume ratios may be due to the high initial solubility exhibited by the painted surfaces.

Figure 9 shows how the area/volume ratio changes with the water level in two cylindrical tanks the height of which is equal to the diameter. Comparison with figure 4 indicates that the values of lead concentration to be expected in normally operating public water supply tanks would be less than those determined experimentally with an area/volume ratio of 0.2.

Summary

The solubility of red lead powder and of lead from three types of red lead paint has been studied in a series of laboratory experiments. The effects of a number of variables were investigated separately.

The solubility of purified red lead in distilled water was found by analysis to be 8.9×10^{-7} gram-mol of Pb_3O_4 per liter (0.553 ppm) at room temperature.

The uptake of lead by water standing in contact with oil base red lead paint varies with the length of time of contact. In an immersion period of 6 days, 11.2 mg. of lead per liter per 200 cm.² of surface dissolved from oil base paint, 0.70 mg. from phenolic base paint, and 0.11 mg. from vinyl base paint.

The amount of lead dissolved by water in contact with oil base red lead paint varies inversely with the time of drying of the paint film.

Repeated immersion tests indicated that the leaching is partly a surface effect, and the dissolution of lead tends to approach a constant value.

Sodium hexametaphosphate causes a reduced rate of lead solvency in distilled water within the range of concentration of that used in treating public water supplies. At relatively high concentrations (greater than 15 ppm) there is an increased solubility of lead.

Sodium hydroxide up to 25 ppm depresses the rate of solution of lead with all three types of paint.

An increased hydrogen-ion concentration up to pH 4 causes a pronounced increase in the rate at which lead is dissolved from the oil base as well as the phenolic and vinyl base paints.

The nature of the material painted did not affect the lead solubility provided that no free metal was in contact with the water.

Results obtained with water samples from eight localities, differing widely in chemical characteristics, indicated that such characteristics have a profound effect on the rate of solution of red lead from paint film.

Of the three paints tested, the oil base paint was at least 10 times more soluble under the conditions of the test than either the phenolic or vinyl base paints.

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f luoridation

- 1** Statement by Arthur S. Flemming,
Secretary of Health, Education, and Welfare
- 2** Report on Fluoridation in the United States
- 3** Statements on Proposed Alternatives
to Fluoridation of Water Supplies

1 Statement by Secretary Flemming

Surgeon General Leroy E. Burney has called my attention to a very significant setback in the progress of the fluoridation program during the last 2 years.

Although controlled fluoridation has been proved over and over again to be an inexpensive and completely safe means of preventing

65 percent of dental decay, only one out of every four people in this country today has this protection.

Moreover—and this is the most disturbing fact of all—the proportion of the population not benefiting from this remarkable health measure is actually increasing.

Why every community with a public water supply has not availed itself of the proved dental health benefits of controlled fluoridation is difficult for me to understand in the light of the following facts:

1. Intensive research over a quarter of a century shows conclusively that water containing a proper amount of fluoride reduces dental decay by about 65 percent.

2. Equally conclusive research has demonstrated that controlled fluoridation is completely safe, causing no bodily harm of any kind.

3. The American Dental Association, the American Medical Association, and virtually all other scientific and professional organizations having competence in the field have recommended the fluoridation of public water supplies.

4. This protection costs only a few cents per person per year. If started in childhood, the protection is effective over a lifetime.

5. Controlled fluoridation does not mean adding a foreign substance to water; all water contains some fluoride. Fluoridation of water as a public health measure simply means controlling the amount of fluoride in a public water supply.

6. Even water containing as much as eight times the amount of fluoride recommended for prevention of tooth decay does not injure a person's health. Too much fluoride in water does cause discoloration of tooth enamel but has never been known to injure health.

7. Public opinion polls reveal that the majority of people who are informed about fluoridation are favorably disposed to the idea.

I have inquired into why, in the light of all these factors, the extension of fluoridation has been lagging in the last 2 years.

I have come to the conclusion that it amounts basically to this: the opponents of fluoridation are a militant minority; the proponents of fluoridation, as is so frequently the case with proponents of new health measures, are an unmilitant majority.

In my review of the situation with Surgeon General Leroy E. Burney and his associates in

the Public Health Service, it seems to me that what is needed is a militant majority for fluoridation.

I am convinced that fluoridation would be proceeding rapidly if the question were decided on its merits by informed people.

Some informed people will, of course, continue to oppose fluoridation as a matter of principle. I respect their views even though I cannot, on the basis of the scientific evidence, concur in their conclusions.

But such persons are not, by and large, the ones who succeed in blocking local fluoridation projects.

For example, some of the most vocal opponents of fluoridation are persons who have been charged by the Food and Drug Administration with making false health claims for nostrums and devices and thereby influencing their customers against seeking needed medical service.

Dr. George F. Lull, then secretary and general manager of the American Medical Association, in an editorial in *Today's Health*, June 1955, used these words to describe the opposition to fluoridation:

"In addition to the sincere opposition which merits respect, there is the usual hue and cry from those who take every opportunity to discredit medical science and legitimate public health progress. We will find in the antifluoridation camp the antivaccinationists, the antivivisectionists, the cults and quacks of all descriptions, in short, everyone who has a grudge against legitimate scientific progress. They bring all manner of irresponsible charges, including the allegation that fluoridation is promoted for commercial profits by those who manufacture the chemicals and machinery and that irresponsible scientists and public officials have been 'bought.' The ridiculousness of such a charge evaporates into thin air when one merely looks at the official and professional bodies that have endorsed fluoridation."

As Dr. Lull implies, the kind of opposition to fluoridation which we are now experiencing is by no means new in the public health field. Indeed, this opposition is very similar to that which arose in the early days of such invaluable health measures as chlorination of public water

supplies, pasteurization of milk, and vaccination. Owing in large part to such opposition, it has taken 50 years, for example, to get widespread acceptance of chlorination. I hope that urban communities which have not yet fluoridated their water supply will not be denied this health benefit for a comparable period.

It is nothing short of tragic to deny millions of children the benefits, now and in their later years, of healthy teeth, particularly when, in addition to the scientific evidence that points to the efficacy of fluoridation, public opinion polls indicate that a majority of citizens desire to take advantage of this established health measure.

Yet this is clearly what is happening in a

number of communities large and small. For example, a poll by Elmo Roper and associates in 1957 showed that 57 percent of the people in cities of 1 million and over said fluoridation was a good idea, while only 20 percent said it was not. In communities of 100,000 to 1 million the response was 50 percent for and 19 percent opposed, while in communities of 2,500 to 100,000 it was 54 percent for and 24 percent against.

As long ago as 1953, when fluoridation was still relatively new and before the opposition became fully organized, a poll by Dr. George Gallup showed that people who knew about fluoridation favored its adoption as a community health measure by a margin of nearly four to one.

2

Report on Fluoridation in the United States

Dental decay is recognized as man's most widespread chronic disease. Few persons escape. No social stratum or age group is immune. A decayed tooth never heals by itself, by prescription, or by advice. About 97 million people in the United States have decayed teeth requiring treatment; more than 21 million others are edentulous; the average high school graduate has had 10 teeth attacked; and family dental bills total \$1.7 billion annually although only 40 percent get treatment. If everyone who needed dental care wanted it, there would not be enough dentists to provide it. The current progressive accumulation of dental disease is a heavy national burden—painful, costly, and disfiguring. This serious health problem remains largely neglected because of the undramatic nature of the disease, cost of treatment, the widespread tendency not to regard dental decay as a hazard, and insufficient professional manpower to provide care. This combination of factors points to the need for a preventive measure that is effective, safe, in-

expensive, convenient, widely acceptable, and automatic. The fluoridation of community water supplies meets these requirements.

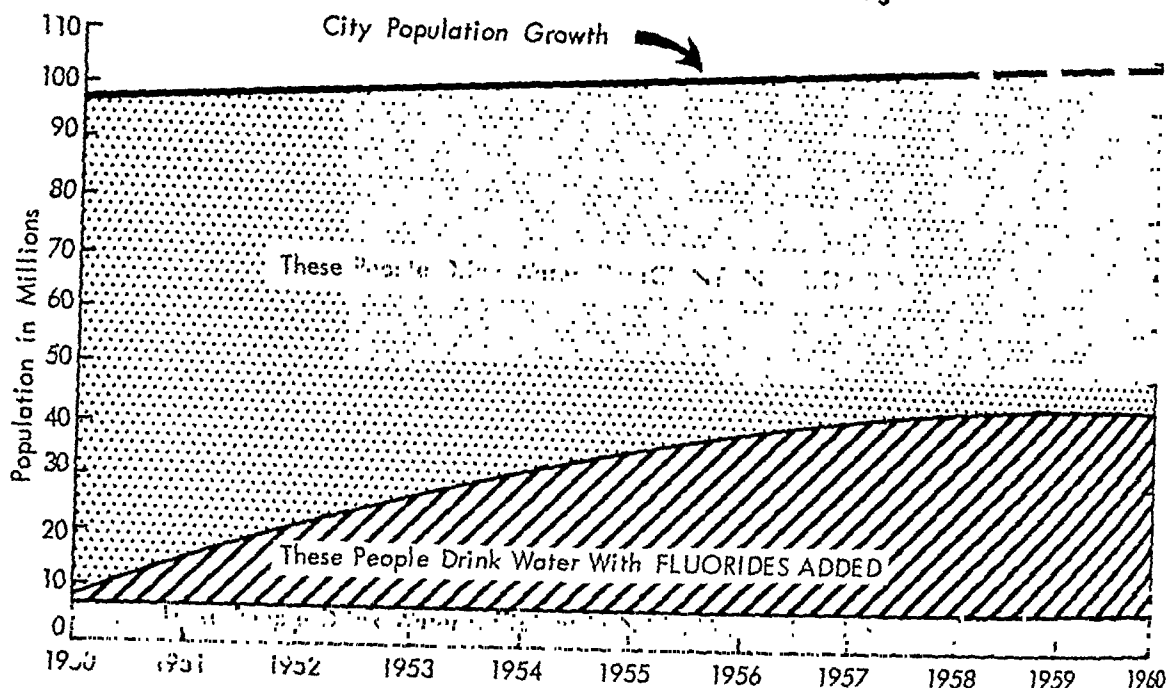
Fluoridation is the adjustment of fluoride-deficient communal water supplies to the optimal level by adding small, but precise amounts of fluoride-containing compound to yield in solution one part of fluoride in every million parts of water. In effect, it supplements the daily ingestion of fluoride to a level which effectively and safely prevents up to 65 percent of the dental decay among children, and provides protection and benefits that continue into adult life. In principle, water fluoridation is similar to standardized water-treatment procedures designed to promote the health of consumers.

Research

The early history of the fluorine and dental decay relationship goes back to the last quarter of the 19th century, when clinicians noted that less tooth decay accompanied mottled enamel. In 1916, Dr. Frederick McKay reported mottled enamel to be a waterborne disease, which in 1931 was discovered to be caused by excessive fluorides. A hypothesis evolved that trace amounts

*Prepared by the Division of Dental Public Health,
Bureau of State Services, Public Health Service.*

Urban Growth and the Fluoridation Lag



of fluoride in water might inhibit dental caries. A series of epidemiological studies was carried out by the Public Health Service led by Dr. Trendley Dean and his associates. They found a strikingly low prevalence of dental decay associated with 1 ppm fluoride in the drinking water. These studies in natural fluoride areas were confirmed by animal experimentation in laboratories and by independent scientists in other countries.

In light of the evidence that no undesirable effects accompanied the dental benefits derived from water supplies naturally containing 1 ppm fluoride, three controlled fluoridation programs were begun independently in 1945 to determine whether these benefits could be duplicated by controlled fluoridation. The results of these and other studies were remarkably uniform and demonstrated that the use of drinking water containing 1 ppm fluoride: (a) produces identical dental and general effects whether the fluoride occurs naturally or is added by mechanical means; (b) effectively, safely, and economically prevents up to 65 percent of tooth decay; and (c) does not produce observable mottling of the teeth.

Although alternative techniques and vehicles have continued to be tested, none of them to

date can substitute for fluoridation as a public health measure. (See statement on proposed alternatives, p. 517.) In the absence of water fluoridation or, where water fluoridation cannot be practiced, direct application of topical fluorides to the teeth has been found to reduce caries. However, the cost in professional time is rather high and limits this method on a large-scale public health basis.

Endorsements

After a thorough examination of all scientific evidence relating to the safety, effectiveness, and practicability of fluoridation, the Public Health Service endorsed it in 1951. Since that time many communities throughout the Nation have instituted fluoridation programs. Careful study of their experience with this measure plus continuing scientific research have provided additional evidence supporting fluoridation. The literature about the relation of fluorides to health now exceeds 8,500 references.

In this country fluoridation is approved by every major scientific and professional organization having competence in the field. It has also been approved by the World Health Or-

ganization, by professional and scientific associations in many foreign countries, and by responsible health officials throughout the world.

Present Status

Today more than 42 million people in the United States (or about 1 in every 3 persons provided water by community water supplies) are drinking water containing the minimum or higher level of fluoride recommended. Of these, 35 million in 1,778 communities are supplied water in which the fluoride level is controlled, and 7 million in 1,903 places use water naturally containing 0.7 ppm or more fluoride. Since 1950, the number of persons provided with fluoridated water in this country has increased by about 34 million. Fluoridation programs are also in operation in 20 foreign countries.

Water engineers report that the addition of fluorides to public water supplies is similar to chlorination and other procedures widely employed in waterworks practice. Fluoridation presents no administrative, technical, or industrial problems of any consequence. Presently, five fluoride compounds are used: sodium fluoride, sodium silicofluoride, hydrofluosilicic acid, ammonium silicofluorides, and fluorspar. Costs of fluoridation vary according to the amount and kind of compound required, but the average cost is 10 cents a year per person. A device developed by Public Health Service engineers now enables communities to use fluorspar, further reducing the costs by two-thirds.

Current investigations by the Public Health Service related to fluoridation include continuing evaluation of community water fluoridation programs; improving technical, control, and testing procedures; developing individual fluoridators for homes and schools in rural areas; testing various fluorides for a more effective agent to be applied topically to the teeth; and developing practical methods for removing excessive fluorides from water supplies.

Decline in Community Acceptance

At first glance, the acceptance of fluoridation during the last 8 years appears satisfactory.

A closer look, however, reveals that most of the gain has been made in the larger cities. Sixty-six percent of the Nation's cities with populations of more than a half million, and 32 percent of the cities with populations between 10,000 and 500,000 have fluoridation programs. By contrast, only 17 percent of those communities having populations of 2,500 to 10,000 and 5 percent of communities with populations of less than 2,500 have such programs. Consequently, most of the people benefiting from this measure live in the larger cities.

Of special concern is the steady decline in the rate of community acceptance in the past 6 years. Community acceptance proceeded slowly from 1945 to 1950, the early years of the demonstration studies. By 1952, however, most scientific and professional groups had examined the evidence and formally approved water fluoridation. That same year 243 communities instituted fluoridation programs. The following year, 1953, was the peak year during which 378 separate communities adopted fluoridation. Since 1953 the number of separate communities starting fluoridation programs has declined. Only 145 places began fluoridation programs in 1958. Moreover, the number of communities which discontinued fluoridation programs in the past 5 years has steadily increased.

The question may well be raised as to why this slow rate of acceptance has occurred, and what steps need to be taken to accelerate the utilization of this measure for the improvement of our Nation's health. Obviously, the big job is yet to be done.

There are two circumstances which explain the initial acceleration and subsequent slowdown in community acceptance of fluoridation. During the earlier years (1945-52) fluoridation was instituted by governing bodies that were convinced by the weight of scientific evidence. Only occasional objections were voiced against the measure. By late 1952, however, the formerly disorganized and sporadic opponents joined forces, forming two national organizations specifically to oppose fluoridation. As a result, the opponents obtained substantial resources; and, by employing a wide variety of tactics, they have been able to thwart the institution of fluoridation.

The other circumstance may be that the com-

munities which normally accept new health measures readily had done so by late 1952. Thereafter the rate of acceptance may have declined somewhat because it is more difficult to get acceptance by the remaining communities.

Organized Opposition

Four different groups oppose fluoridation—those who oppose it on principle; those in whom the measure arouses personal anxieties; those who acquire status, political gain, or personal profit; and those who are uninformed. Opponents, mostly laymen, but also including a few scientists, physicians, and dentists, carry on a nationwide campaign through their two national organizations in the United States.

It is quite evident that a relatively few people can create doubt and fear in many others who otherwise would accept the advice of competent experts. Antifluoridationists publish a monthly newspaper and submit articles to medical journals, popular magazines with national circulations, and newspapers. A book, "The American Fluoridation Experiment," has become the opposition textbook and is widely distributed. Opponents have delayed fluoridation by numerous injunctions. They have filed suits unsuccessfully in more than a dozen State courts. Two cases were even appealed to the U.S. Supreme Court where they were dismissed. Opponents send a steady flow of letters and literature to Federal, State, and local officials. As one after another irresponsible claim is refuted, opponents change their attack. Local merchants and editors frequently are intimidated by threats and harassing telephone calls. Proponents are abused by smear tactics and public heckling, and they and their families are threatened with physical harm. It is noteworthy that opposition in many communities comes in the first instance, not from residents of the city considering fluoridation, but from elsewhere.

Objections to fluoridation, however unfounded or unrealistic, strike a sympathetic chord in a sizable number of people. Continuous sensational assertions of an emotional type have far more effect on public opinion than the precise correct statements of scientists. Furthermore, some people, once persuaded to op-

pose something they do not understand, seldom change their attitude.

From coast to coast, numerous strife-torn communities, confused and divided over a word that was not even in their vocabulary a generation ago, can attest to the effectiveness of the antifluoridation campaign. The referendum is a particularly effective framework in which to oppose fluoridation. Irresponsible statements, misleading and horrifying, have succeeded in defeating fluoridation by referendums in Seattle, Wash., San Diego, Calif., Birmingham, Ala., Columbus, Ohio, and well over 230 other communities. By referendums, twice as many communities have rejected fluoridation as have adopted it.

Several factors contribute to the problem. Tooth decay is not a dramatic, infectious, crippling, or killing disease. Most people have learned to live with their dental problems and do not regard them as sufficiently serious to require treatment. The scientific arguments for fluoridation are not simple; fluoridation cannot compare with the drama of the wonder drugs, and the benefits to be derived from it cannot be observed for more than a decade—even then they are not obvious.

Viewed in historical perspective, the opposition to fluoridation has been quite similar to that which arose when other public health measures were introduced, particularly chlorination, pasteurization, immunization, and vaccination. The psychological bases for objecting to fluoridation are the same: (a) fear of being physiologically injured by a potentially noxious agent; (b) ethical aspects, with special concerns about invasion of human rights; (c) rejection of a new discovery that conflicts with entrenched beliefs; and (d) resistance to change.

The crux of the problem is that a relatively few people are blocking the progress of an approved health measure. By so doing they are not only withholding health benefits from a large portion of the population, especially children, but they are perpetuating a disease that seriously impairs the Nation's health, manpower, and economic resources. If dental decay were a direct cause of death, there would be little doubt of the widespread adoption of water fluoridation.

Statements on Proposed Alternatives to Fluoridation of Water Supplies

Tablets

"An extensive program has been instituted in Switzerland (1) in an attempt to control dental caries through the administration of fluoride tablets to school children. Held and Piquet (2) in a preliminary report of a study of 6-year-old school children, which continued 3 years, reported that compressed sodium fluoride tablets were effective in reducing the incidence of dental caries. With the report of positive results, the practice has spread rapidly, and approximately 500 Swiss communities are using this method of caries prevention (1). Apparently the tablets are distributed in the primary schools; the method of administration, if any, of the fluorine prophylaxis to preschool children and infants is not known. A recent communication from H. J. Schmidt indicates that prophylaxis by means of fluoride tablets is also being administered in the state of Hesse, Germany.

"Use of fluoride tablets has been limited in the United States. Dietz (3) has reported a study involving a small number of children. Positive results were reported. Bibby, Wilkins, and Witol (4) state that the use of fluoride lozenges may contribute to the control of dental caries, and that the effects are probably the result of fluorine acting on external surfaces of the teeth. The number of persons observed was relatively small and the duration of the study only 12 to 14 months.

"In discussing the question of using fluoride tablets beginning at 5 or 6 years of age (first school year), certain presumptive evidence from fluoridation studies might be kept in mind. From the behavior of the results that A. L. Russell (personal communication, 1955) is obtaining in his studies in Montgomery and Prince Georges Counties, Md., the ingestion of fluorides after the period of tooth formation may not give the same protective effect as ingestion during the period of calcification. Effects observed in the earlier fluoridation

studies support this inference; for example, the present dental caries prevalence rates in the Grand Rapids children who were 6 years old when fluoridation started (now 16 years old) as compared to those of the 16-year-old, Aurora, Ill., children who have used fluoride water all during their lifetime. It would seem logical, in the light of present evidence, to assume that an appreciable measure of protection would be lost if fluoride tablets were used by children only after starting to school, even if fluoride tablets are theoretically as effective as fluoride-bearing water.

"Another point to be borne in mind is that from the standpoint of effective public health application, the individual administration of fluoride tablets presents more difficulties than a broad community action, such as fluoridation. As a large portion of a child's permanent teeth are calcified prior to 6 years of age (normal time to enter primary school), a high degree of intelligent participation on the part of each mother, an alertness against waning interest, and a daily constancy of purpose measurable in years, is essential. The health education question posed by the tablet method of application becomes highly important if any degree of success is to be attained.

"In the light of present available evidence, prophylaxis by means of fluoride tablets cannot be evaluated properly until carefully controlled studies, including adequate numbers of children and observed over the necessary number of years, are available. At the present time, such studies are not available. From the standpoint of theoretical physiology, there would seem no reason why fluoride tablets should not be effective, providing some method can be found to ensure their conscientious daily consumption, at least over the period of tooth calcification. Because of the health education essential for their success it might be well, for the present, to limit the use of fluoride tablets in the control of dental caries to prescription by the dentist.

munities which normally accept new health measures readily had done so by late 1952. Thereafter the rate of acceptance may have declined somewhat because it is more difficult to get acceptance by the remaining communities.

Organized Opposition

Four different groups oppose fluoridation—those who oppose it on principle; those in whom the measure arouses personal anxieties; those who acquire status, political gain, or personal profit; and those who are uninformed. Opponents, mostly laymen, but also including a few scientists, physicians, and dentists, carry on a nationwide campaign through their two national organizations in the United States.

It is quite evident that a relatively few people can create doubt and fear in many others who otherwise would accept the advice of competent experts. Antifluoridationists publish a monthly newspaper and submit articles to medical journals, popular magazines with national circulations, and newspapers. A book, "The American Fluoridation Experiment," has become the opposition textbook and is widely distributed. Opponents have delayed fluoridation by numerous injunctions. They have filed suits unsuccessfully in more than a dozen State courts. Two cases were even appealed to the U.S. Supreme Court where they were dismissed. Opponents send a steady flow of letters and literature to Federal, State, and local officials. As one after another irresponsible claim is refuted, opponents change their attack. Local merchants and editors frequently are intimidated by threats and harassing telephone calls. Proponents are abused by smear tactics and public heckling, and they and their families are threatened with physical harm. It is noteworthy that opposition in many communities comes in the first instance, not from residents of the city considering fluoridation, but from elsewhere.

Objections to fluoridation, however unfounded or unrealistic, strike a sympathetic chord in a sizable number of people. Continuous sensational assertions of an emotional type have far more effect on public opinion than the precise correct statements of scientists. Furthermore, some people, once persuaded to op-

pose something they do not understand, seldom change their attitude.

From coast to coast, numerous strife-torn communities, confused and divided over a word that was not even in their vocabulary a generation ago, can attest to the effectiveness of the antifluoridation campaign. The referendum is a particularly effective framework in which to oppose fluoridation. Irresponsible statements, misleading and horrifying, have succeeded in defeating fluoridation by referendums in Seattle, Wash., San Diego, Calif., Birmingham, Ala., Columbus, Ohio, and well over 230 other communities. By referendums, twice as many communities have rejected fluoridation as have adopted it.

Several factors contribute to the problem. Tooth decay is not a dramatic, infectious, crippling, or killing disease. Most people have learned to live with their dental problems and do not regard them as sufficiently serious to require treatment. The scientific arguments for fluoridation are not simple; fluoridation cannot compare with the drama of the wonder drugs, and the benefits to be derived from it cannot be observed for more than a decade—even then they are not obvious.

Viewed in historical perspective, the opposition to fluoridation has been quite similar to that which arose when other public health measures were introduced, particularly chlorination, pasteurization, immunization, and vaccination. The psychological bases for objecting to fluoridation are the same: (a) fear of being physiologically injured by a potentially noxious agent; (b) ethical aspects, with special concerns about invasion of human rights; (c) rejection of a new discovery that conflicts with entrenched beliefs; and (d) resistance to change.

The crux of the problem is that a relatively few people are blocking the progress of an approved health measure. By so doing they are not only withholding health benefits from a large portion of the population, especially children, but they are perpetuating a disease that seriously impairs the Nation's health, manpower, and economic resources. If dental decay were a direct cause of death, there would be little doubt of the widespread adoption of water fluoridation.

supply is fluoridated or already contains sufficient fluorides.

4. The practical difficulties and hazards that would exist, both in controlling the rate of application and in testing the amount of fluorides added to relatively small volumes of milk by the large number of individual milk plants that might adopt this practice. From an administrative standpoint, the fluoridation of milk would spread the responsibility for control, and would necessitate the introduction of a complicated system of supervision.

5. The likelihood that only a portion of the milk supply would be fluoridated in a given market, resulting in a lack of uniform distribution. This would reduce the benefits to be obtained by the community as a whole. From this point of view, it would appear that water is a much better vehicle."

—*U.S. Public Health Service. The fluoridation of milk—a statement of policy.*

"Technical problems are such that representatives of the milk industry have resisted the idea of fluoridating milk in the past. It has been estimated that fluoridation will add 1 cent per quart to the milk price. Health department supervision of milk fluoridation would be costly. To provide adequate checking, 25,000 samples per year would need to be tested in the laboratory. The health department would have to construct adequate facilities for the testing program and enlarge the staff to perform the work. It is estimated that the annual cost exclusive of facilities would be \$294,800 for performance of tests by official methods of analysis. The cost of fluoridated milk for school children only in New York City is estimated at \$2,140,000, or \$2.14 per person."

—*From Report to the Mayor on Fluoridation for New York City, by the Board of Health, City of New York, October 24, 1955, p. 38.*

"In regard to the distribution [of fluoridated milk], the committee feels that there would be a lack of uniformity of intake in various parts of the country and that small farms and dairies in rural districts would have problems in controlling the addition of fluoride to small quantities of milk. Furthermore, the intake of milk during the first year of life would depend on

the extent to which the babies were breast fed. Human milk contains only traces of fluoride, the highest concentration found in our study (Hodge and associates, unpublished data) being 0.09 ppm."

—*The problem of providing optimum fluoride intake for prevention of dental caries. National Academy of Sciences-National Research Council, Publication 294, November 1953, p. 12.*

Bread

"Common foods suitable as carriers for fluoride, must above all meet the requirements of food technology for easy handling and mixing. Flour, as an example, may be considered a feasible vehicle from the standpoint of stability and the technology of distribution of the fluoride uniformly throughout the food. According to the study of Widdowson, the consumption of cereal increased from approximately 2 ounces per individual per day in the 1-year-old group to an average of 6 ounces in the 12-year-old. The consumption of bread showed roughly the same quantitative increase with age. Consequently, the average intake of fluoride, if added to flour, bread, or cereal, would come near to the desired increase with age from infancy to adolescence. The average daily consumption of flour in this country is estimated to be similar, or about 6½ ounces per individual per day in the adult. Considering the desirable intake of fluoride in older children as 1 mg. per day, the approximate amount of fluoride to be incorporated in the flour could be calculated. However, we have already referred to English observations suggesting that there are marked individual variations within single age groups in the consumption of bread. In addition, it is believed, for lack of exact data, that in the United States bread would not be used to a great extent in infancy during the early stage of tooth development."

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Salt

"No exact information has been obtained with regard to the consumption of salt in various age

When all considerations are weighed, it would seem that in a community having a public water supply, the most economical and efficient manner of applying the fluorine prophylaxis to the greatest number of people is through fluoridation of the domestic water."

—H. Trendley Dean. *Fluorine in the control of dental caries. Journal of the American Dental Association*, vol. 52, January 1956, pp. 7-8.

"The preparation of fluoridated water at home by adding fluoride tablets to tapwater would be less expensive than the purchase of bottled water, but much more costly than communally fluoridated water. However, the proper preparation of such water in the home presents a very difficult problem of regulation. The problem is not merely one of assuring the addition of the proper amount of fluoride but also of proper mixing of the solution. An additional disadvantage of both alternative water procedures is that of inconvenience. It would be difficult to induce a high proportion of housewives and certainly of children to get their drinking and cooking water from a bottle rather than from the convenient sink tap.

"The daily consumption of tablets likewise raises questions of effectiveness and practicality. In the hands of trained personnel at the water treatment plant fluoride levels can be precisely controlled. But experience with other home remedies—even the aspirin tablet—prompts caution. The philosophy that 'if one tablet is good, two are better' may produce harm. A child's accidental ingestion of a large number of tablets is a great hazard from the viewpoint of those familiar with accidents in the home."

—From *Report to the Mayor on Fluoridation for New York City*, by the Board of Health, City of New York, October 24, 1955, pp. 33-34.

Bottled Water

"The process of preparing fluoridated water to be distributed in the same manner as bottled water involves the installation of equipment in one or more bottling plants and distribution to those who are willing to buy it. It is unlikely that a bottling plant would install the same kind of equipment that would be used in water treatment. One method that might be used is

that of dissolving tablets containing fluoride ion in the water. A number of technical problems are introduced. The water would have to be tested for fluoride ion by the health department and bottled water companies would have to employ technical staff to supervise treatment procedures.

"Persons using the water must pay for the water as well as the fluoride ion. It is estimated that bottled fluoride water would cost 5 cents per day per person using it, or about \$18.25 per year per person.

"Minimum health department supervision of bottled water fluoridation is estimated at \$20,000 per year. The minimum estimate of the cost of bottled fluoride water at present prices would be not less than \$18.25 per person per year. Such a price is of course prohibitive, and it is doubtful if many adults or children would have the benefit of fluoride water if such a fluoridation program were instituted."

—From *Report to the Mayor on Fluoridation for New York City*, by the Board of Health, New York City, October 24, 1955, p. 37.

Milk

"The Public Health Service does not favor the addition of fluorides to milk for the purpose of prevention of dental caries. The reasons for this position are as follows:

1. It is not known whether the addition of fluorides to milk is effective in preventing tooth decay, although it is known that such addition is effective in water. Further studies of this matter are indicated.

2. The individual consumption of milk by children varies considerably more than their water intake. For economic and other reasons, a considerable number of children in some age groups consume little or no milk. Furthermore, the use of fluorides in milk has not been investigated. On the other hand, we do know, on the basis of examination of many thousands of children who have consumed water varying in fluoride concentration, the amount of fluorides which must be added to water to be effective.

3. The possibility that fluoridation of milk may be harmful in an area where the water

supply is fluoridated or already contains sufficient fluorides.

4. The practical difficulties and hazards that would exist, both in controlling the rate of application and in testing the amount of fluorides added to relatively small volumes of milk by the large number of individual milk plants that might adopt this practice. From an administrative standpoint, the fluoridation of milk would spread the responsibility for control, and would necessitate the introduction of a complicated system of supervision.

5. The likelihood that only a portion of the milk supply would be fluoridated in a given market, resulting in a lack of uniform distribution. This would reduce the benefits to be obtained by the community as a whole. From this point of view, it would appear that water is a much better vehicle."

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—*The problem of providing optimum fluoride intake for prevention of dental caries. National Academy of Sciences-National Research Council, Publication 294, November 1953, p. 11.*

Salt

"No exact information has been obtained with regard to the consumption of salt in various age

groups. It is not even certain that this vehicle would be practical from a technical standpoint; it would have to be determined, for instance, whether the addition of sodium fluoride would be uniform throughout and whether it would affect unfavorably the anti-hygroscopic property of the product. While the daily consumption would have to be determined more exactly, there are doubts as to whether this vehicle would serve the purpose for infants and young children."

—*The problem of providing optimum fluoride intake for prevention of dental caries. National Academy of Sciences-National Research Council, Publication 294, November 1953, p. 12.*

Summarization

"Various vehicles have been proposed for the systemic administration of fluoride in regions where water fluoridation cannot be applied. The most important of these vehicles seem to be milk, table salt, and fluoride tablets which are now all being tested. Milk might be a possible alternative vehicle in countries with a universal milk consumption by the children, while salt might be possible for regions with a low or irregular milk consumption.

"At present, the value of milk and salt for fluoride administration cannot be compared with that of drinking water, since the evidence in favor of the first two vehicles is incomplete; in particular, there is a total lack of clinical

evidence of their effectiveness. On the other hand, tablets have been shown to have some positive effect, although the experiments with tablets have been performed for a much shorter time and on a much smaller scale than drinking water fluoridation.

"Continued research on these fluoridation methods should be encouraged. If their effectiveness, practicability, and safety of application can be satisfactorily demonstrated, they may become very valuable in regions where water fluoridation is impossible."

—*Expert Committee on Water Fluoridation, First Report. World Health Organization Technical Report Series No. 146, Geneva 1958, p. 19.*

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Drinking Water Standards To Be Revised

An advisory committee of physicians, scientists, engineers, and administrators has been appointed to consider revision of the Public Health Service Drinking Water Standards. At its first meeting, March 24-25, 1959, special attention was given to limits for nonliving contaminants such as radionuclides and synthetic organics.

The Drinking Water Standards, first formulated 45 years ago and last revised in 1946, were originally applicable only to water used on interstate carriers. This is still their only legal basis. However, State health departments, the American Water Works Association, and the Armed Forces have accepted them as standards for public water supplies.

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, April 7, 1959*

Indian Health

ONE of the Nation's most dramatic health stories of our time has been unfolding quietly and steadily among American Indians and Alaska natives.

I have received from Surgeon General Leroy E. Burney a report of recent progress in the Indian health program covering improvements in health and medical services to the 385,000 American Indian and Alaska native beneficiaries. This report traces health trends since 1954, immediately prior to the transfer of the program to the Public Health Service in 1955, through facts and figures available in the closing quarter of 1958. Here are some of the highlights:

- Tuberculosis, once the leading cause of death among Indians and Alaska natives, dropped a full 40 percent among the Indians in the 4-year period ended with 1957. Among Alaska natives, the decrease was even greater—63 percent in the same period. This disease now ranks as the eighth cause of death among Indians, and fifth among Alaska natives.

- New cases of tuberculosis have dropped 25 percent among Indians and about 33 percent among Alaska natives.

- The Indian infant death rate has been reduced by 12 percent.

- The Indian death rate from diseases of the stomach and intestines came down by 26 percent.

This is the first report of a series to be issued regularly so that full, current information on the progress of health services to Indians and Alaska natives may be constantly available.

In calling attention to progress since 1954, neither Dr. Burney nor I wish to give the impression that this country's Indian health problems are solved. This is far from true,

even with respect to tuberculosis. That disease still claims nearly four times more lives among American Indians than among the Nation's general population, and upwards of eight times more Indians contract tuberculosis. The tuberculosis death rate among Alaska natives is more than 10 times greater than the national average.

Health problems among American Indians and Alaska natives still are unique and severe. Language differences combined with limited understanding by Indians of health and disease concepts still constitute obstacles of considerable magnitude. Geographic and cultural isolation on some 250 Federal Indian reservations and in hundreds of native villages in Alaska, combined with an extremely low economic level, are serious handicaps in the provision of services.

The health program operates over tremendous areas in 25 States, including Alaska. Its hospital at Point Barrow, above the Arctic Circle, is the most northerly in the world. In this area, the Public Health Service has medical personnel who drive their own dogsleds and fly their own airplanes. The first operation ever performed in Alaska involving the transplanting of a cornea was on a 16-year-old Eskimo girl in the Public Health Service hospital at Anchorage in December 1958.

Distances, population dispersion, and absence of local water supplies pose severe obstacles for doctors, nurses, health educators, and sanitation personnel in the southwest. One Public Health Service dental officer travels 10,000 miles a year treating his patients on the vast Navajo reservation, which covers an area the size of West Virginia. Construction of an urgently needed new hospital for the Papagos

on the Arizona desert was delayed for months because of difficulties in locating a water supply.

Gross and widespread environmental sanitation problems—notably lack of safe water supply and overcrowded and inadequate housing—persist as the allies of excessive disease rates. These are problems which the Indians are generally unable to correct within their own economic resources. The task ahead is still enormous.

Substantial increases in funds for Indian health during recent years have enabled the Public Health Service to make inroads against critical disease problems. Trained professional staff members, so vital to the success of a direct service operation such as the Indian health program, have been substantially increased in number. A good start has been made in eliminating the generally unsatisfactory condition of Indian health facilities and the shortage of modern medical equipment.

Notable progress also has been made against trachoma, the infectious eye disease which still exists in this country among Indians. Dr. Phillips Thygeson, internationally recognized

authority on this disease, serves as the Public Health Service's consultant in planning and developing trachoma control activities. His "Trachoma Manual and Atlas" published last year by the Service is, I am told, a valuable aid in the diagnosis and treatment of trachoma not only among Indians but in other countries where this disease is a major health problem.

Although Indian infant deaths dropped 12 percent in the 4 years ended with 1957, the Public Health Service recognizes that the present rate of 57 deaths per 1,000 live births is excessively high. Increasing numbers of Indian babies are born in the Service's Indian hospitals, and as a result the Indian infant death rate in the first month of life now compares favorably with that of the general population. However, because of unfavorable environment, Indian infants die at more than five times the rate for the population as a whole during the succeeding 11 months of life.

We will never be satisfied until the health of the Indians is fully comparable with that of most Americans. It is our aim not only to hold present gains but to increase our efforts in this field.

New Reports on Death Rates

A new series of 62 reports presenting age-specific and age-adjusted death rates is being released by the National Office of Vital Statistics, Public Health Service. The series, Vital Statistics—Special Reports Volume 49, is entitled "Death Rates for Selected Causes by Age, Color, and Sex: United States and Each State."

These reports include both age-adjusted and age-specific rates for the average of the 3 years 1949, 1950, and 1951.

With the exception of No. 1, which summarizes data on death from all causes, each number contains data for a single cause of death or group of related causes. The reports follow the classifications in the "Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death." Thirty of the series have already been released, and the remainder are scheduled for publication during 1959.

Copies are available from National Office of Vital Statistics, Public Health Service, Washington 25, D.C.

Each nation in the Western Hemisphere has a concern with childhood accidents, which vary in nature according to geography, technology, and custom.

Accident Prevention in Childhood

JAMES L. GODDARD, M.D., M.P.H.

ACCIDENTS are the leading cause of death in children 5 to 14 years of age in 13 countries of the Western Hemisphere. If trends of the past two decades continue, we shall find within 20 years that in many nations of the Americas accidents will constitute the leading cause of death for all age groups 1 to 15 years.

Granted the urgency of organizing a broad attack on the childhood accident problem, how shall we proceed?

Once the established techniques of factfinding and casefinding have defined the task of preventing childhood accidents in any given area or community, the procedure eventually emerges.

Each specific accident hazard requires specific methods of prevention. The traffic-filled street in New York or Rio de Janeiro, the Texas ranch, or the Peruvian mountain village contains unique hazards in a unique setting, requiring its own preventive program.

Mortality and Morbidity

Nothing illustrates more clearly the geographic variation in the relative significance of accidents to children than an analysis of mortality tables for the 17 countries of the Americas and Puerto Rico, Jamaica, and Trinidad. Data on the five principal causes of death, with rates per 100,000 population, for children in

two age groups, 1-4 and 5-14 years, for 1956 are given in figures 1 and 2. In considering death rates in these two age groups, it should be noted that the rates are much lower for the age period 5-14 years than for the age period 1-4 years in many countries where disease still takes a high toll.

Only in the United States and Canada were accidents the leading cause of death in the 1-4 age group. In only eight of the remaining countries were accidents even listed among the five leading causes of death. In the 5-14 age group, however, accidents are the leading cause of death in two-thirds of the countries reporting, and only in Guatemala are accidents missing from the five chief causes of death. The highest rate given is for Ecuador, where the figure (39.7) is almost double the United States rate of 20.

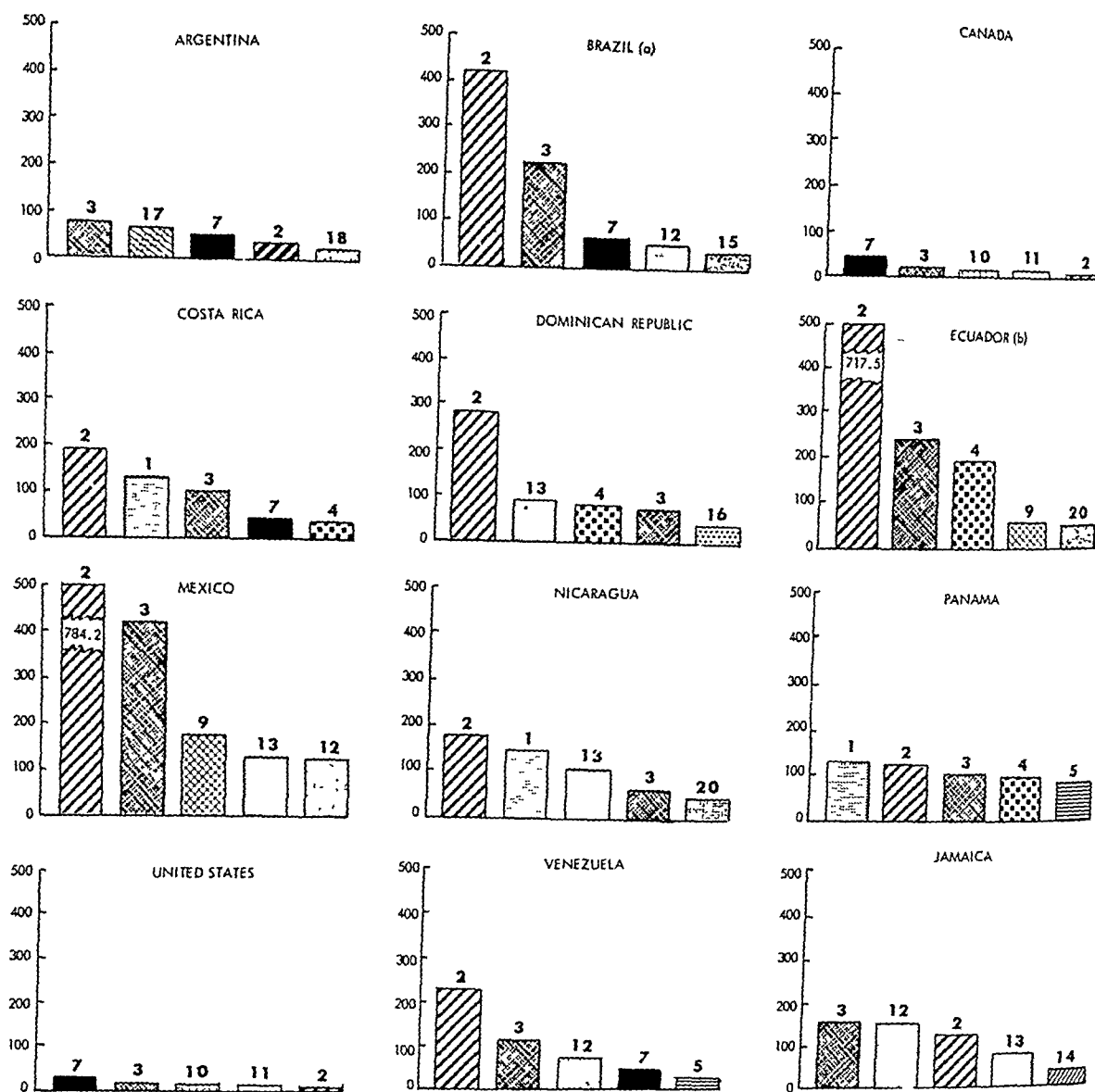
The California Health Survey of 1954-55 reveals that incidence of illness from accidents ranks second only to diseases of the respiratory system for children under 15 years of age (table 1).

For those who survive the common diseases of infancy and childhood, there is the ever-

Dr. Goddard is chief of the Accident Prevention Branch, Public Health Service. This article is based on a paper presented at the 15th Pan American Sanitary Conference held in San Juan, Puerto Rico, September-October 1958.

Figure 1. Principal causes of death among children 1-4 years of age in the Americas, 1956.

Rates per 100,000 population



* Includes only Federal District and seven State capitals.

^b Includes only capital cities of provinces.

Source: Summary of Four-Year Reports on Health Conditions in the Americas, Scientific Publication No. 40, Pan American Sanitary Bureau, June 1958.

present threat of death or injury from accidents. This threat is both widespread and complex.

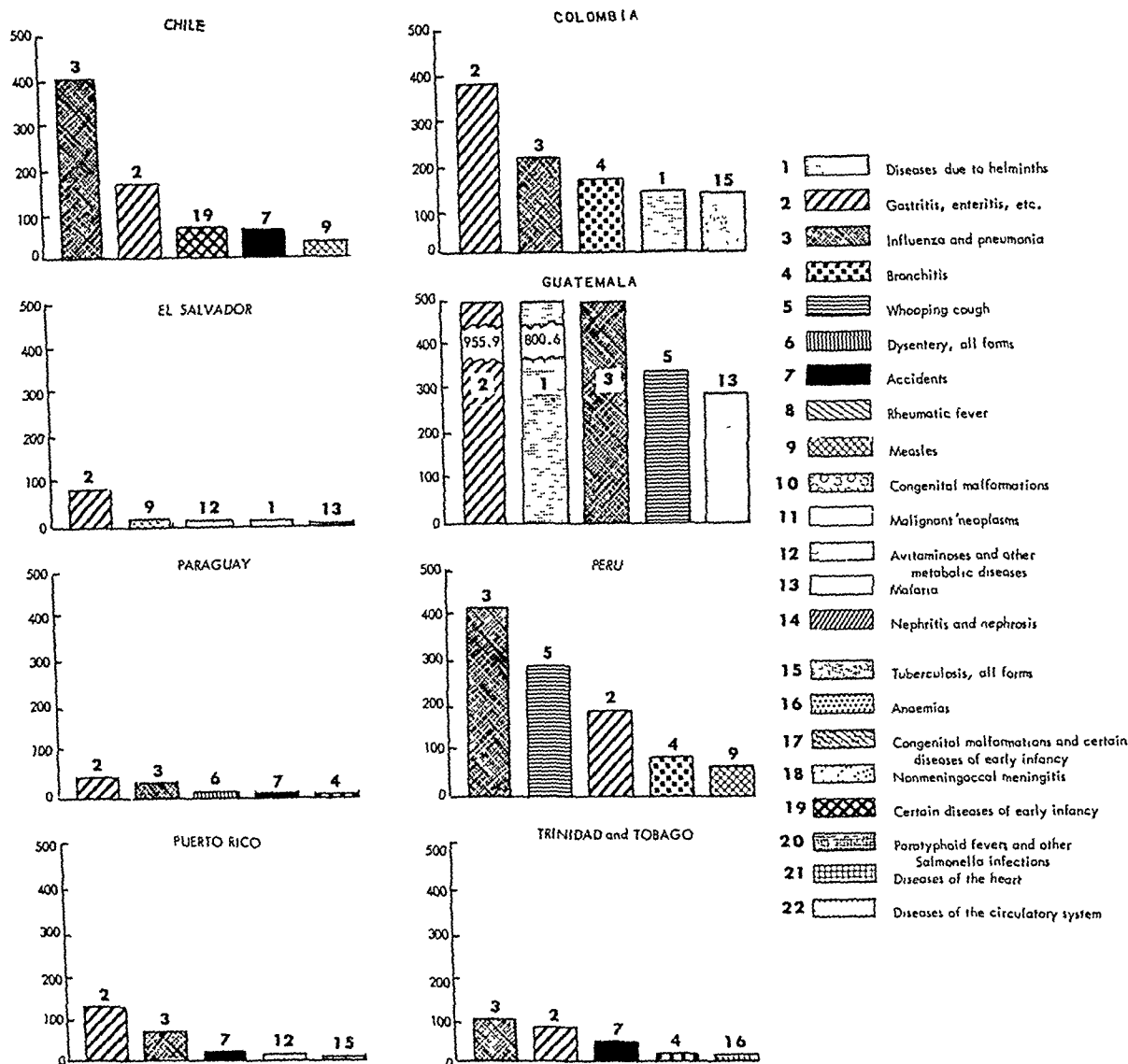
On the basis of the first 6 months' report of the National Health Survey in the United States, it is estimated that approximately 16 million children are injured each year, with the rate about twice as great in boys as in girls.

Of girls under 15 years of age, one child in three is injured each year, and most of them are injured in and around the home.

Throughout the Americas, frequently encountered causes of accidental death in children are motor vehicle accidents, drowning, burns, poisoning, falls, and bites from poisonous insects or snakes.

Figure 1. Principal causes of death among children 1-4 years of age in the Americas, 1956—Continued.

Rates per 100,000 population



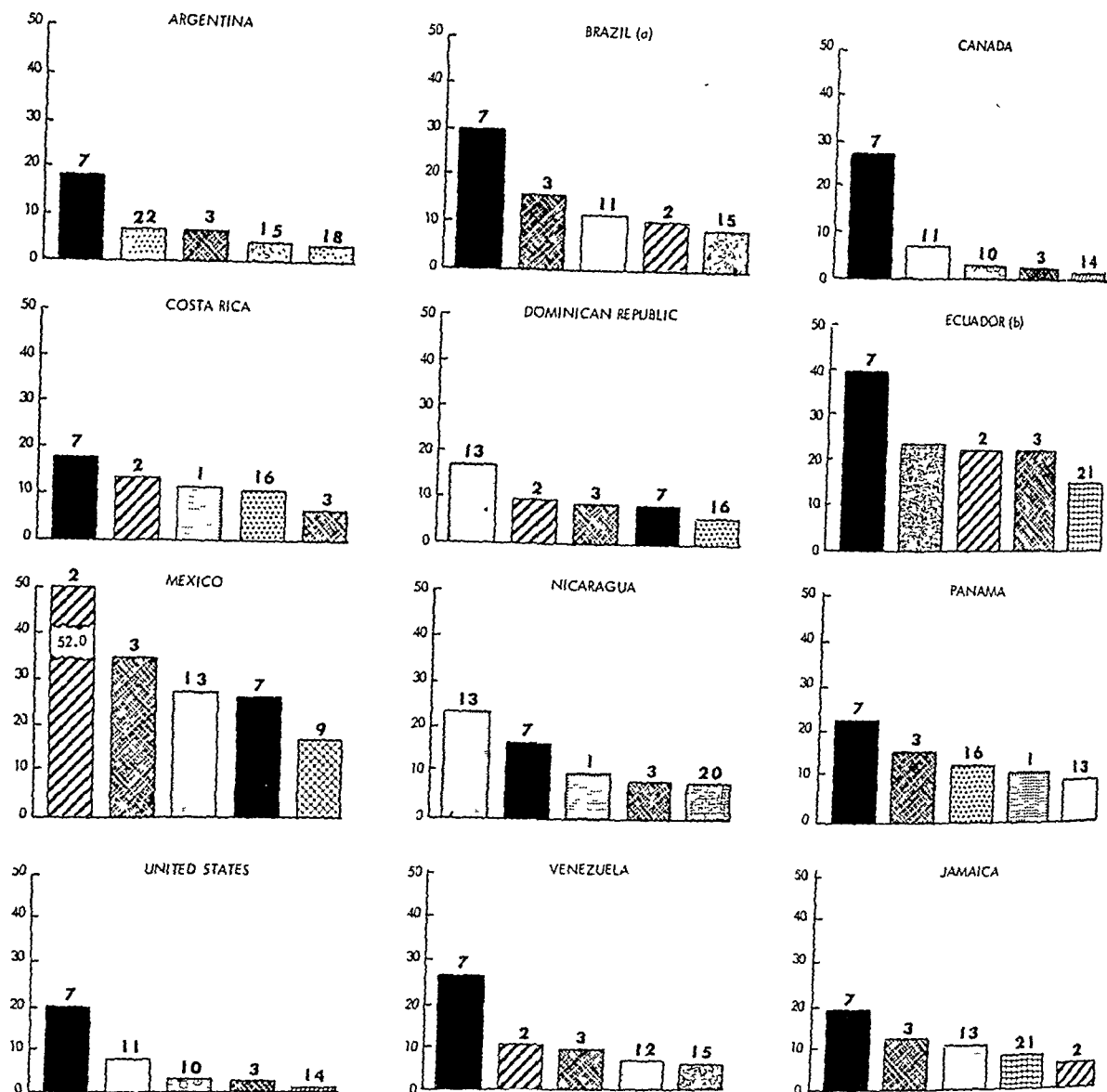
The number of reported deaths of children 1-4 and 5-14 years of age from accidents, with rates per 100,000 population, in the Americas is presented in table 2.

Analysis of specific causes of mortality for the United States and Venezuela reveals a greater number of both fatal and nonfatal injuries among boys. It is generally assumed that the growing boy is more active and more inclined to take risks than a girl of the same

age. There are also other striking differences. In the 5- to 14-year-old girls in Venezuela, for example, burns are the most frequent cause of accidental death. In boys of the same age, drowning is the most frequent cause, and burns rank fifth. Obviously such differences are related to exposure factors. The risk of drowning is greater for boys because more boys are exposed to the risk. Burns are more frequent for girls because they spend more time in the

Figure 2. Principal causes of death among children 5-14 years of age in the Americas, 1956.

Rates per 100,000 population



^a Includes only Federal District and seven State capitals.

^b Includes only capital cities of provinces.

SOURCE: Summary of Four-Year Reports on Health Conditions in the Americas, Scientific Publication No. 40, Pan American Sanitary Bureau, June 1958.

home at this age, learning how to cook and, of special importance, wearing clothing more susceptible to fire hazards (table 3).

In Puerto Rico, a slightly different pattern is noted for the age group 1-4. Poisoning is the leading cause of accidental death, followed by burns, motor vehicle accidents, drowning, and falls.

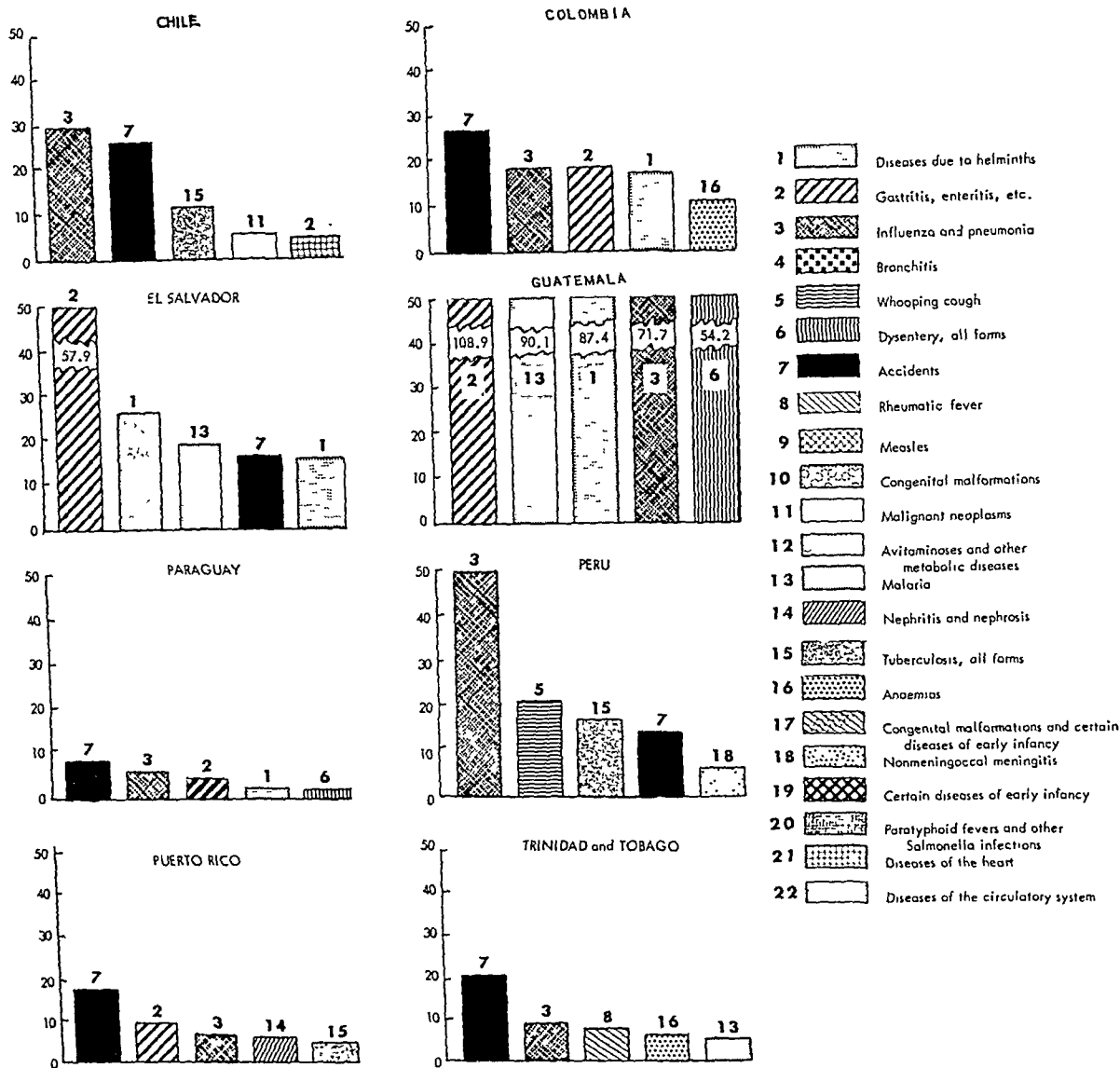
In Mexico, deaths from tetanus are frequent in the age group 5-14. Most cases of tetanus are preceded by an untreated injury, usually a laceration or puncture wound of the foot.

Poisonings

Accidental poisoning is a special threat, particularly to children under 2 years of age. The

Figure 2. Principal causes of death among children 5-14 years of age in the Americas, 1956—Continued.

Rates per 100,000 population



common agents responsible for fatalities in the United States are petroleum products, aspirin and salicylates, arsenical compounds, and lead and its compounds (table 4).

Central and South American countries also report that petroleum products and pesticides are frequently the cause of fatal poisonings.

Better definition of the problem of accidental poisoning is possible when hospitals and emergency centers keep simple but accurate records

of the causative agents. The experience of 23 poison control centers in the United States is summarized by type of substance in table 5.

In approximately 25 percent of those cases involving medicine, aspirin or other salicylates were ingested. Aspirin may not be quite so widely available elsewhere. In 230 poisoned patients seen in 1 year at a children's hospital in South America, only 2 had swallowed aspirin or salicylates. Petroleum products and bleach-

Table 1. Selected measures of illness by diagnosis for children under 15 years of age, California, 1954-55: Rates per 1,000 children per year

Diagnostic group	Incidence of illness	Days of disability	Hospital admissions	Hospital days
Total.....	5,243	17,340	41	229
Infectious and parasitic diseases.....	260	2,680	2	29
Neoplasms.....	10	120	1	4
Cardiovascular diseases.....	20	380	-----	-----
Diseases of respiratory system.....	2,520	8,810	16	36
Diseases of digestive system.....	635	1,590	5	38
Accidents.....	1,033	700	6	31
All others.....	765	3,060	10	93

SOURCE: California Health Survey, Health in California, California State Department of Public Health, September 1957.

ing fluid were the two most frequent poisons reported by this institution.

Site of Accidents

Although detailed data on the sites of childhood accidents are not now available, preliminary analysis of the U.S. National Health Sur-

vey data for all age groups shows that 45 percent of all accidental injuries occur in the home, 30 percent in public places, 14 percent at work, and 10 percent on the highway. A study of accident cases treated in the emergency room of the municipal hospital in San Juan, Puerto Rico, had a somewhat similar pattern of results: 56 percent of all injuries were caused by home accidents, 34.5 percent were accidents at public places, 6 percent were motor vehicle accidents, and 3.5 percent were work accidents.

The use of a uniform accidental injury report, such as form PHS-2916, obtainable from the Accident Prevention Branch, Public Health Service, Washington 25, D.C., can provide a wealth of data in a short time. On the basis of data gathered, preventive measures can be designed to meet the specific preventive needs.

Causative Factors

Accident causation is beginning to inspire formal research programs of an increasingly elaborate nature. Almost every one of the physical, natural, and social sciences has something to contribute to our understanding of this problem.

There is some risk at this stage, therefore, of being overwhelmed by the complexity of re-

Table 2. Number of deaths from accidents in children 1-4 years and 5-14 years in the Americas, with rates per 100,000 population, 1956

Area	1-4 years		5-14 years		Area	1-4 years		5-14 years	
	Number	Rate	Number	Rate		Number	Rate	Number	Rate
Argentina ¹	690	42.9	2,670	18.6	Mexico ³	2,056	56.5	2,091	26.7
Brazil ⁴	324	61.8	309	30.1	Nicaragua.....	40	25.6	59	16.8
Canada ⁵	702	45.5	895	27.7	Panama.....	30	26.5	52	23.1
Chile.....	423	61.9	416	26.2	Paraguay.....	29	14.1	37	8.4
Colombia.....	897	53.2	904	27.0	Peru ¹	289	30.3	310	14.6
Costa Rica.....	47	37.2	47	18.1	United States ³	4,791	32.6	6,099	20.0
Dominican Republic ³	76	21.7	56	8.3	Venezuela.....	329	43.2	369	25.6
Ecuador ^{2,6,7}	56	49.7	89	39.7	Jamaica ⁸	46	29.9	67	18.4
El Salvador ³	61	23.5	93	16.6	Puerto Rico ³	61	20.2	102	16.9
Guatemala ³	61	14.2	145	17.5	Trinidad and Tobago.....	38	44.3	34	20.9

¹ Year 1953.

² Detailed list numbers E800-E999.

³ Year 1955.

⁴ Federal District and 7 State capitals.

⁵ Excluding Yukon and Northwest Territories.

⁶ Capital cities of provinces.

⁷ Rates based on population estimated by the Pan American Sanitary Bureau.

⁸ Year 1954.

SOURCE: Summary of Four-Year Reports on Health Conditions in the Americas, Scientific Publication No. 40, Pan American Sanitary Bureau, June 1958.

search needs or confused by the tremendous scope of research possibilities. Every aspect of the classic epidemiological trinity (host, agent, environment) undoubtedly contains secrets that will ultimately yield to study and enhance our understanding of accident causation.

To help define the child as an "accident host," clearly we need to learn as much as we can about his growth and development, about the relationship between his mental and physical condition and accidents, about his educational background and progress.

The "agent" in childhood accidents can be almost anything he contacts, and this group of causative factors must be studied in a systematic and specific way if even limited progress is to be made. The motor vehicle is a prime example of an accident agent that is readily identified and isolated for study. Specific toxic substances that cause accidental poisoning offer a similarly delimited field of study.

In general, advances will be achieved by careful pursuit of specific study goals.

The child's "environment," the third element in the epidemiological triad, is as small as the crib or as large as the whole community, depending upon the age of the child. Geography, climate, economics, sociology, even history and politics play a part in molding the child's environment and in creating the causative relationship between that environment and accidents.

Since space does not permit an exhaustive analysis of this multitude of causative factors, we must be content with calling attention to a few dynamic factors. Common to all accidents are the person and the environment; their respective susceptibility and potential; habits, attitudes, and patterns of operation; specific changes, events, or irregularities in the pattern; and the built-in protective factors or feedbacks which may affect or avert the trigger action.

"Accident susceptibility" is obviously strong in a child because this factor is conditioned by training, experience, and judgment. Also, such special physiological and mental factors as illness, emotional upsets, and the like may be expected to affect children even more drastically than adults.

Finally, the "unsafe act or trigger mechanism" is clearly illustrated when a child starts a fire while playing with matches, or swallows poison while in search of candy.

In short, close study of such dynamic factors will well repay all who are professionally or personally concerned with improved accident prevention techniques based on better understanding of the causative factors. These have been charted graphically (1).

Prevention

Effective programs for the prevention, control, and amelioration of the effects of childhood accidents will be achieved through definition of the problem, formulation of specific hy-

Table 3. Accidental deaths in children according to the five principal types in the continental United States, 1956, and in Venezuela, 1954, by sex and age group

Type of accident	Continental United States		Venezuela	
	Males	Females	Males	Females
1-4 years				
Motor vehicle.....	800	638	28	22
Drowning.....	463	191	47	38
Fire and explosion of combustible material.....	443	472	---	---
Poisonings, solid or liquid.....	196	140	28	19
Falls.....	155	99	---	7
Burns.....	---	---	26	27
Poisonous bites by venomous animals.....	---	---	6	---
5-14 years				
Motor vehicle.....	1,785	855	44	28
Drowning.....	981	204	55	15
Firearms.....	357	72	---	---
Fire and explosion of combustible material.....	263	404	---	---
Falls.....	138	50	19	4
Poisonous bites by venomous animals.....	---	---	39	6
Burns.....	---	---	15	31

SOURCES: For continental United States, U.S. National Office of Vital Statistics, Vital Statistics of the United States, 1956; for Venezuela, unpublished data from División de Estadística y Censos, Dirección de Salud Pública, Sanidad y Asistencia Social, República de Venezuela.

potheses, testing and validation of the hypotheses, and translation of findings into action.

Since each accident results from a multiplicity of causative factors, no single solution can be expected. Diversities in cultural patterns, environmental conditions, and host factors necessitate careful selection of preventive activities.

Recommended activities are presented here with respect to principles of primary and secondary prevention. Many principles are, of course, applicable to both.

Primary Prevention

DEFINITION: There is a serious lack of sufficient data concerning accidents in childhood. Mortality and morbidity data, supplemented by special epidemiological studies, are the conventional sources of such information. In those Latin American countries where hospital and emergency services are provided by the government, data on accidental injuries may be obtained more readily than in voluntary or private institutions in Canada and the United States.

The minimum requirements of an accident reporting system include the following items for each injured patient: age, address, sex, race, marital status, occupation, hour, day, and date

of the accident, activity of the injured person at the time of the accident, nature of the injury, part of the body injured, severity or condition of the patient, name and address of

Table 5. Accidental poisoning cases by substance ingested, reported by poison control centers in 23 areas of the United States

Type of substance	Treated cases		Telex inquiries
	Number	Percent	
Medicines.....	3,354	52.3	449
Internal.....	3,063	47.8	354
External.....	291	4.5	95
Household preparations.....	687	10.7	430
Petroleum distillates.....	484	7.6	29
Cosmetics.....	69	1.1	163
Pesticides.....	800	12.5	214
Gases and vapors.....	5	.1	10
Plants.....	59	.9	61
Paints, solvents, etc.....	159	2.5	83
Other.....	739	11.5	151
Not stated.....	51	.8	4
Total.....	6,407	100.0	1,594

¹ Various time periods from July 1954 through November 1957.

SOURCE: Tabulated reports submitted to the National Clearinghouse for Poison Control Centers from poison control centers.

Table 4. Number of deaths due to accidental poisoning by type of solid and liquid substance among children under 15 years of age, continental United States, 1952-56

Type of substance	1952	1953	1954	1955	1956
Morphine and other opium derivatives.....	5	5	3	5	
Barbituric acid and derivatives.....	9	11	14	8	
Aspirin and salicylates.....	86	71	86	75	
Bromides.....		1	1		
Other analgesic and soporific drugs.....	6	13	3	8	
Sulphonamides.....	1				
Strychnine.....	14	15	9	9	
Belladonna, hyoscyne, and atropine.....	4	4	2	2	
Other and unspecified drugs.....	47	44	49	36	
Noxious foodstuffs.....	1	1	3	2	
Alcohol.....	6	10	6	4	
Petroleum products.....	111	102	83	71	8
Industrial solvents.....	10	11	9	11	
Corrosive aromatics, acids, and caustic alkalies.....	30	30	21	16	1
Mercury and its compounds.....	4		1		
Lead and its compounds.....	45	52	34	40	3
Arsenic and antimony, and their compounds.....	23	27	22	24	40
Fluorides.....				1	
Other and unspecified solid and liquid substances.....	60	71	72	68	90
Total.....	462	468	418	389	426

SOURCE: Unpublished data from the U.S. National Office of Vital Statistics.

hospital and attending physician, and identification of the reporter.

Such data may be supplemented by analysis of death certificates. As programs are developed, routine specification on the death certificate of the type of fatal accident will be required.

The study of accidents by type (motor vehicle, falls, drowning, poisoning) and by type of injury (burns, lacerations, wounds) helps to suggest remedial measures. Defects in design of equipment or environmental hazards are frequently exposed by such analysis.

The redesign of refrigerators has been undertaken as a consequence of studies which revealed how many children crawled into discarded ice-boxes and were locked in.

The Cornell University Automotive Crash Injury Research project has profoundly influenced the design of passenger cars in the United States. The importance of the safety belt, validated by the Cornell studies, has altered the thinking of automotive safety engineers.

In a rural area of Georgia, an epidemiological study, inspired by the high incidence of burns reported among children there, formed the basis for a public health program to encourage the use of screens in front of fireplaces.

A Latin American analogy may be found in rural Chile where a brazier on the floor or the ground is the usual equipment for cooking. Protective devices, coupled with public health educational campaigns, could diminish this particular threat.

Knowledge of the relationship between childhood growth and development and accident patterns at different ages is necessary for educational programs directed to parents and schools. Longitudinal studies, while expensive and time consuming, will always be necessary.

The discriminate use of surveys on cross sections of population groups also helps in identifying and defining needs.

Retrospective study of deaths from accidents using supplemental death certificate forms has been made for years in different parts of the United States. The data have been useful in educating the public and in alerting health workers to hazards.

EDUCATION: Education is an elementary step

in accident prevention. In all fields, education progresses as distribution of information is fortified by experience.

Public health agencies need to be equipped with appropriate information and skills and motivated to accept educational responsibility when they attempt accident prevention.

The staff of a health agency may help other groups in the community and the citizens of the community themselves to acquire the necessary facts, equipment, and habits.

Physicians are one of the essential groups in accident prevention. They become excellent teachers. No medical practitioner speaks with more authority on safety for children than the pediatrician. Dr. Harry F. Dietrich defines the pediatrician's role as follows: (a) he must gain an enlightened awareness of the problem; (b) he must attempt to immunize his patients against serious accidents by providing parents with the theory of accident prevention and sufficient advice and encouragement to apply it; (c) he must alert the entire medical profession to the gravity and needs of the problem; and (d) he must enlist the aid of all available organizations in a continuous community and national campaign to prevent childhood accidents.

To this, perhaps, should be added: (e) he can alert us to new hazards; and (f) he can, by virtue of his detailed knowledge of the patterns of growth and development (both mental and physical), advise us as to the appropriateness and acceptability of preventive measures.

The school teacher is also important in accident prevention, as are all key leaders in the community.

It is the opportunity of the health agency to organize, stimulate, coordinate, inspire, and, sometimes, to finance cooperative efforts by all components of the society.

COORDINATION OF ACTIVITIES: The prevention of childhood accidents is of concern to many governmental agencies, traffic departments, and departments of education, health, social security, and labor. There is clearly a need for closer coordination between agencies engaged in this common effort. The role of the health agency in some instances actually may be limited to coordination; in other situations, the health department may play a direct role as well.

Coordination of health agency activities with educational departments is particularly important. The teaching of safe living has long been accepted as a responsibility of the schools in the Americas. In this work, health agencies assume a subordinate role, which initially may be limited to provision of suitable and up-to-date material. Later it may be possible to propose and assist in the development of preventive activities, such as swimming classes for preschool children as well as school children.

The frequency of traffic accidents suggests the need for coordination among several agencies. In countries such as the United States, Canada, and Mexico, where school-boy patrol activities have been initiated, liaison has been effected between the education and traffic departments. Extension and improvement of such programs is a goal of many health agencies.

Another civic activity is the development of adequate recreational facilities for children. A well-planned recreational program helps in keeping youngsters off the streets and away from traffic hazards. Again, such a program is seldom the direct responsibility of the health agency, but the demonstration of the need and recommendations for action could be.

LEGISLATION: In many instances, special hazards to children have been eliminated or controlled by the enactment and enforcement of legislation.

For example, in the United States flammable fabrics in children's clothing were brought under Federal regulation by act of Congress. The U.S. Congress has similarly acted to protect the public by legislation on the manufacture and sale of insecticides.

There are similar problems throughout the Americas, and as the reporting of injuries is improved, new hazards will be exposed which may warrant legislative control.

RESEARCH: There is obviously a need for developing and continuing operational research, as exemplified by surveys, analyses of hospital data, and analyses of death certificates. In addition, it is essential to initiate and expand basic research on human factors in accidents.

As has been mentioned, the epidemiological technique lends itself readily to studies in the accident field. McFarland, Gordon, and others

have pointed out the value of applying the principles of epidemiology to the study of accidents. Use of this technique already has led to reductions on a limited scale in certain types of injuries and deaths. In the past, these have been related usually to environmental factors or agent factors immediately associated with accidents.

One value of the epidemiological approach is that it facilitates appraisal of the data collection process. Epidemiological studies provide the basis for determining the value of data currently being collected, as well as pointing out the need for routine collection of additional data.

A second type of important research is related to improving education. Practically nothing has been done as yet to increase understanding of why people accept or reject recommendations for their own safety, or how various cultures are influenced in acceptance or rejection of specific practices.

A third type of essential research relates to improvement in treatment of injuries, through planned cooperative study involving several hospitals or treatment centers. One example is the study of kerosene poisoning now being conducted in the United States by the American Academy of Pediatrics, the American Public Health Association, and the Public Health Service. By pooling data from numerous hospitals, it is hoped that the question of the value of lavage in these cases can be reliably determined. Another such study could be carried out to compare the results from various treatments for serious burns.

The clinical study or case study will also be valuable in childhood accident prevention. The individual clinician, and particularly the pediatrician, can make a significant contribution through careful observation and analysis of patients seen day-to-day.

Secondary Prevention

Hazards to children are not wholly eradicable. Thus efforts must be directed not only toward a reduction of fatal accidents but also toward amelioration of the effects. Prevention of deaths from secondary causes and prevention or modification of disabilities are, there-

fore, aspects of the accident problem that cannot be neglected.

IMPROVEMENT OF EMERGENCY SERVICES: It was conclusively demonstrated during World War II that survival rates, length of hospitalization, and even the degree of disability could be related to the quality and distribution of emergency care.

The significance of careful handling of the victim, from the time of injury until definitive care begins, is appreciated by the medical profession. Unfortunately, their concern has not always been communicated to those responsible for emergency services.

There are three major elements involved in the care and transport of the injured: training of personnel, adequacy of equipment, and distribution of services in relation to population and the facilities used by the population.

Untrained ambulance attendants, inadequate equipment, speeding ambulances, lack of services in rural areas (as well as in some urban areas) are common throughout the Americas. Curry and Lyttle (2), in their excellent description of how one community was successful in overcoming these difficulties, provide a blueprint that can be adopted by others.

Adequate emergency room services are vital to secondary prevention. The controlling factors are again the training of personnel, the adequacy of equipment, and the availability of services. The special problem presented by accidental poisoning demonstrates the importance of recognizing these factors. Not only must the physician be capable of directing or providing general treatment for the child, he must, because of the multitude of possible toxic agents, be able to track down the specific ingredient.

The prevention of secondary complications is not limited to proper treatment for poisoning. Lack of treatment or inadequate treatment may introduce further stresses. For example, in Mexico, as has been pointed out, there are a significant number of deaths each year caused by tetanus in the age group 5-14 years.

REHABILITATION SERVICES: Applied early, rehabilitation services contribute to reduction in the degree of disability following severe injury. Indeed, the caseload of rehabilitation centers in the Americas is comprised largely of accident

victims. As more of these facilities are developed and the time lag between injury and rehabilitation services is decreased, a marked improvement can be expected. Although the expense of rehabilitation is usually well justified, the prevention of serious injury is even more economical.

Summary

Extension of current trends suggests that accidents will, within the next two decades, be the leading cause of death in children 1 to 15 years of age in many nations of the Americas.

Rehabilitation centers in the Americas report that caseloads are comprised largely of accident victims.

Each specific hazard must be identified and prevented on an individual basis, but traditional public health procedures, such as epidemiology, provide tested methods.

Although diseases such as gastritis and enteritis are the first cause of death for half the countries of the Americas in the 1 to 4 age group, accidents are the leading cause in two-thirds of these countries in the 5 to 14 age group. Nonfatal accidents are found to cause great economic loss because of resultant disabilities and longer and more expensive hospitalizations. Motor vehicle accidents, drowning, burns, poisoning, falls, and bites of insects and snakes are leading causes of accidental death. With significant exceptions, boys have more accidents than girls. More than one-half the accidental poisoning cases occur under 2 years of age, the toxins varying from country to country.

Mortality and morbidity data gathered from surveys are essential bases for initiating accident prevention activities by health departments. U.S. National Health Survey data indicate 45 percent of all accidental injuries occur in the home.

Accident survey data help to define epidemiological study areas and aid evaluation of programs. Accident causation, the subject of increasing study, is extremely complicated and awaits the application of a multidiscipline approach. The host-agent-environment triad of the epidemiological method is relevant. Accurate record systems are essential to accident studies. Analysis of accurate records has made

possible specific successful prevention activities in the United States and can serve other nations of the Americas.

Both longitudinal and retrospective studies of childhood accidental deaths and injuries contribute to prevention.

Primary and secondary prevention benefit equally by educational activities. Education in accident prevention is also a major duty of a public health agency. Physicians can perform valuable educational work in this field.

Health departments can establish leadership in accident prevention and coordinate the work of other community groups.

Research is needed in epidemiology, educational techniques, and emergency treatment and first aid. Emergency treatment services can be greatly strengthened as a secondary prevention technique.

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Epidemiological Notes

Meningococcal Infections

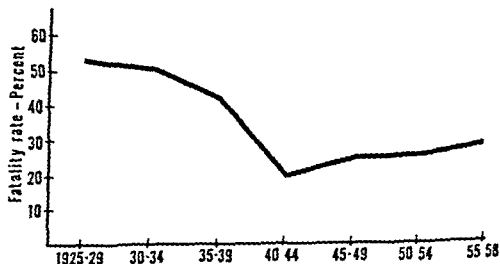
A progressive decline in mortality from certain bacterial infections followed the introduction of sulfonamides in 1937 and of antibiotics in the next decade. The fatality rates for meningococcal infections declined from a level of about 40 percent just prior to the use of sulfonamides to about 20 percent during the next few years. However, in the past 15 years the fatality rate has remained at a slightly higher but relatively constant level of about 25 percent, as shown in the chart.

The two principal classes of meningococcal infections are meningitis and septicemia. The number of deaths for each of these types has fluctuated with increases and decreases in reported incidence of cases. About 1950 approximately two-thirds of all deaths from meningococcal infections were attributed to meningitis, but during the past few years there has been about the same number ascribed to meningococemia as to meningococcal menin-

gitis. Since no morbidity data by type of infection are available, it cannot be determined whether the septicemic form is becoming relatively more frequent.

The number of deaths from meningococcal infection currently reported annually is about 800, which is far in excess of those from diphtheria, measles, streptococcal sore throat and scarlet fever, typhoid fever, or whooping cough. Since 1955 meningococcal infection has outranked poliomyelitis as a cause of death.

Case fatality rates for meningococcal infections, United States, 1925-58.



The fact that this acute infection causes 800 deaths a year and 1 fatality for every 4 cases reported suggests the need for the development of more effective methods for its control.—DR. CARL C. DAUER, *medical adviser, National Office of Vital Statistics, Public Health Service.*

Poliomyelitis in the United States, 1957

LAURI D. THRUPP, M.D., HELEN E. FORESTER, B.A.,
and JACOB A. BRODY, M.D.

POLIOMYELITIS reported in the United States during 1957 reached the lowest level since 1942. A total of 5,485 cases were reported to the National Office of Vital Statistics, Public Health Service, a rate of 3.2 per 100,000 population. Of these cases, 2,499 were reported as paralytic, and 2,826 nonparalytic. The paralytic status was unspecified for the remaining 160 cases.

Table 1 presents total national poliomyelitis incidence rates from 1935 through 1957 as reported to NOVS. Although wide annual variations occurred, the incidence of poliomyelitis remained high from 1948 through 1955. During 1956, half as many cases occurred as during the previous year, while in 1957, reported cases were only one-fifth of the 1955 figures.

Seasonal Distribution

Variability in seasonal distribution patterns as well as in annual poliomyelitis incidence in recent years is further apparent from figure 1, which presents the seasonal curve of weekly reports to NOVS for the years 1942, 1947, and 1952 through 1957.

For paralytic poliomyelitis alone, as shown in figure 2, the seasonal rise in 1957 was gradual, and peak incidence was not reached until

Dr. Thrupp, formerly chief of the Poliomyelitis Surveillance Unit, Communicable Disease Center, Public Health Service, Atlanta, Ga., is now with the Fourth Medical Service, Boston City Hospital. Miss Forester is a statistician and Dr. Brody, epidemic intelligence service officer, with the Poliomyelitis Surveillance Unit.

the end of September (39th week), much later than the late August peaks reached in 1955 and 1956. Data specifying paralytic status, prior to 1955, are not available on a nationwide scale.

During 1957 the seasonal distribution curve for paralytic poliomyelitis differed considerably from nonparalytic poliomyelitis. Cases reported in the *poliomyelitis surveillance program* during 1957 by week of onset are presented in figure 3. Whereas nonparalytic disease reached a sharp, seasonal peak in early August, paralytic poliomyelitis rose gradually to a minor peak in early August and subsequently remained at a plateau, not reaching maximum weekly incidence until almost 2 months later. The proportion of paralytic cases among reported poliomyelitis cases was notably lower in all regions of the country during July and August as compared with the remainder of the year.

Morbidity Reporting

In recent years increasingly widespread application of virus diagnostic tissue-culture techniques has permitted study of numerous outbreaks of nonparalytic aseptic meningitis. It is now well documented that many agents of the ECHO and Coxsackie groups are capable of producing an illness clinically indistinguishable from aseptic meningitis caused by the poliovirus. On rare occasions these agents have also been associated with paralytic disease.

During 1957, large outbreaks of illness with aseptic meningitis syndrome due to nonpoliomyelitis enteroviruses were recorded in many States, including Wisconsin, Minnesota, Michi-

Data Collection

Basic functions of the National Poliomyelitis Surveillance Program are the continual collection of data on the safety and efficacy of poliomyelitis vaccine and the study of the epidemiological trends of poliomyelitis in the United States. Established in April 1955 at the Communicable Disease Center of the Public Health Service, the program is based on participation by local and State health departments, the National Office of Vital Statistics, diagnostic and research laboratories, the National Foundation for Infantile Paralysis, and others with responsibility and interest in the field of poliomyelitis and poliomyelitis-like diseases. Mimeographed Poliomyelitis Surveillance Reports are issued regularly, reviewing data reported in the program. In addition to these periodic reports, reviews of information recorded in 1955 and 1956 have been presented (1-4).

During 1957, 47 States, the District of Columbia, and three Territories participated with the Poliomyelitis Surveillance Unit in studying data, including age, race, sex, date of onset of symptoms, paralytic status, and vaccination status of reported poliomyelitis cases. The present report reviews poliomyelitis incidence during 1957 and summarizes the epidemiological patterns in that year in comparison with 1955 and 1956.

gan, Ohio, North Carolina, Virginia, and Tennessee. These included communitywide epidemics of febrile illnesses often with aseptic meningitis symptoms or skin rash, or both, associated with ECHO-9 virus.

With reported poliomyelitis at a low level, individual case diagnosis has become more important. During the year, a relatively low percentage of cases were paralytic. This percentage was lowest in July and August, the period during which the aseptic meningitis epidemics were occurring. A proportion of the cases reported as nonparalytic poliomyelitis during this time are felt to have been caused by the ECHO and Coxsackie viruses. Included in this group are endemic aseptic menin-

gitis cases, as well as early cases from aseptic meningitis outbreaks later demonstrated epidemiologically and virologically to be due to other than polioviruses.

Routine practices in the morbidity reporting of such cases vary. While a number of non-poliomyelitis aseptic meningitis cases were included in routine morbidity reports as nonparalytic poliomyelitis, data recorded in the epidemiological reports to the Poliomyelitis Surveillance Unit were refined in some States by subtraction of cases from known aseptic meningitis outbreaks initially reported as nonparalytic poliomyelitis.

Distribution

Geographic

In contrast with recent years, no large outbreaks of paralytic poliomyelitis occurred during 1957 in the United States. Table 2 presents poliomyelitis cases reported in the poliomyelitis surveillance program by State and region during 1956 and 1957 and estimated attack rates by paralytic status. The generally low incidence of paralytic disease in all regions is apparent. Highest attack rates for 1957 were reported in the southeastern, south central, and southwestern regions, where paralytic rates were 1.8, 2.9, and 2.0 per 100,000,

Table 1. Total national poliomyelitis incidence, 1935-57

Year	Cases	Rate per 100,000	Year	Cases	Rate per 100,000
1935...	10,839	8.5	1947...	10,734	7.5
1936...	4,523	3.5	1948...	27,902	19.1
1937...	9,511	7.4	1949...	42,173	28.4
1938...	1,705	1.3	1950...	33,300	22.0
1939...	7,339	5.6	1951...	23,386	18.6
1940...	9,826	7.5	1952...	57,879	36.9
1941...	9,086	6.8	1953...	35,592	22.5
1942...	4,033	3.0	1954...	38,476	23.9
1943...	11,540	9.3	1955...	28,985	17.6
1944...	16,935	14.7	1956...	15,140	9.0
1945...	12,101	10.3	1957...	5,485	3.2
1946...	25,196	18.4			

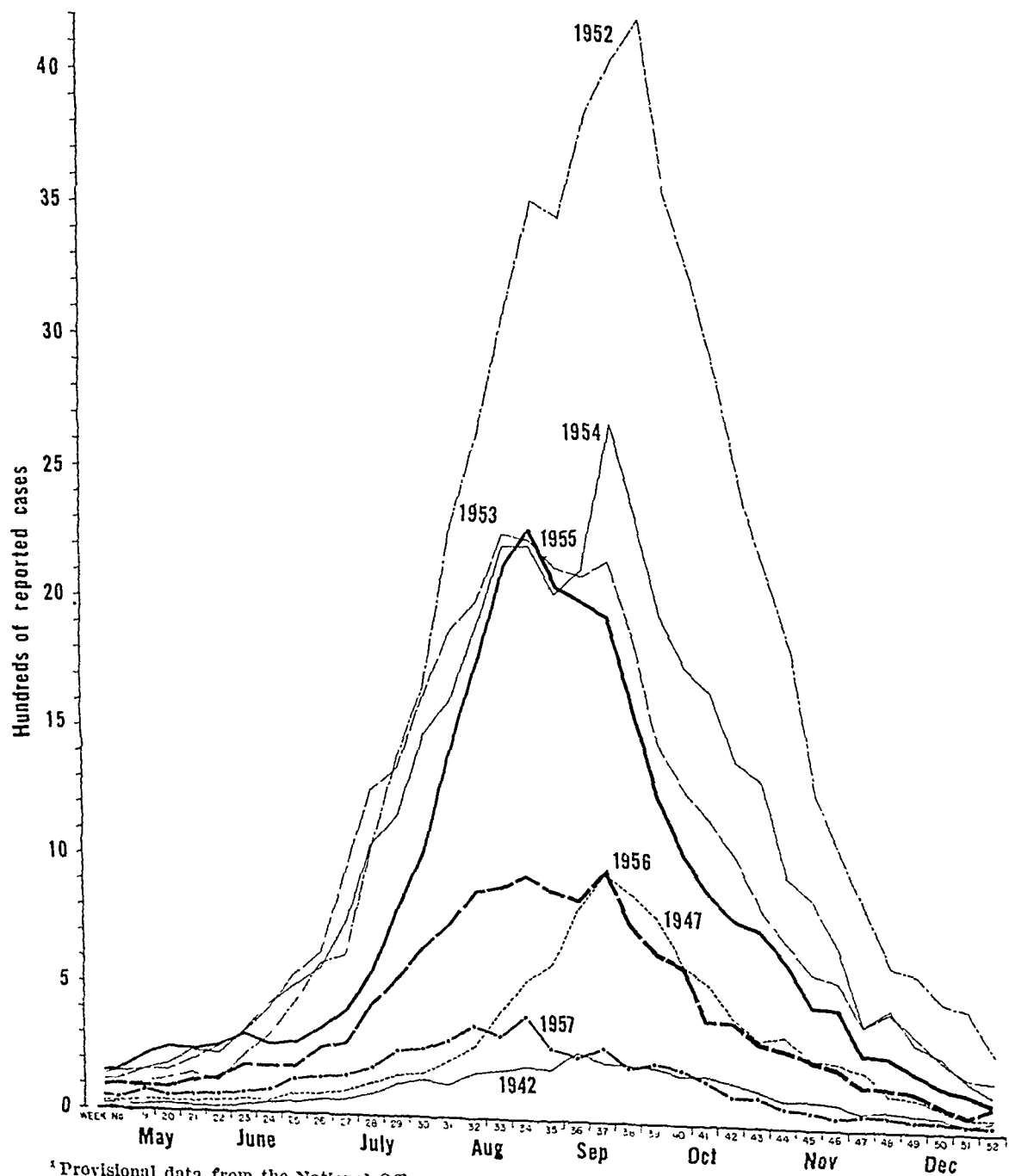
SOURCES: For 1935-1949, The Notifiable Diseases, Annual Reports, Public Health Service, 1935-49; for 1950-57, National Office of Vital Statistics, Weekly Morbidity and Mortality Report, vol. 6, No. 53, Oct. 29, 1958. Population estimates are from the Bureau of the Census.

respectively. Only Texas and the District of Columbia reported more than 3 paralytic cases per 100,000, whereas in 1956 this rate was exceeded in 27 States.

Age

During the past 5 years there has been a progressive rise in the proportion of paralytic cases among preschool children. As shown in

Figure 1. Poliomyelitis incidence in the United States, 1942, 1947, 1952-57.¹



¹ Provisional data from the National Office of Vital Statistics, Public Health Service.

table 3, 44 percent of paralytic cases reported in the 1957 poliomyelitis surveillance program were in children under 5 years of age, compared with 42 percent in 1956, 32 percent in 1955, and 29 percent in 1952. This concentration of paralytic poliomyelitis in the preschool age group was observed throughout the Nation, although the tendency was more marked in southern regions.

In figure 4, age-specific attack rates for paralytic poliomyelitis in the United States during 1955, 1956, and 1957 are plotted on a logarithmic scale. During 1957, as in 1956, the highest age-specific rates occurred at 1 year of age, with a rapid decline thereafter to relatively stable rates beyond age 10. This pattern is in contrast with the experience during the previous 20 years (5), when attack rates in this country generally tended to remain high throughout the first decade.

The remarkable trough in paralytic poliomyelitis attack rates among children 7 and 8 years in 1955 has persisted in this cohort through 1956 (then 8 and 9 years of age) and

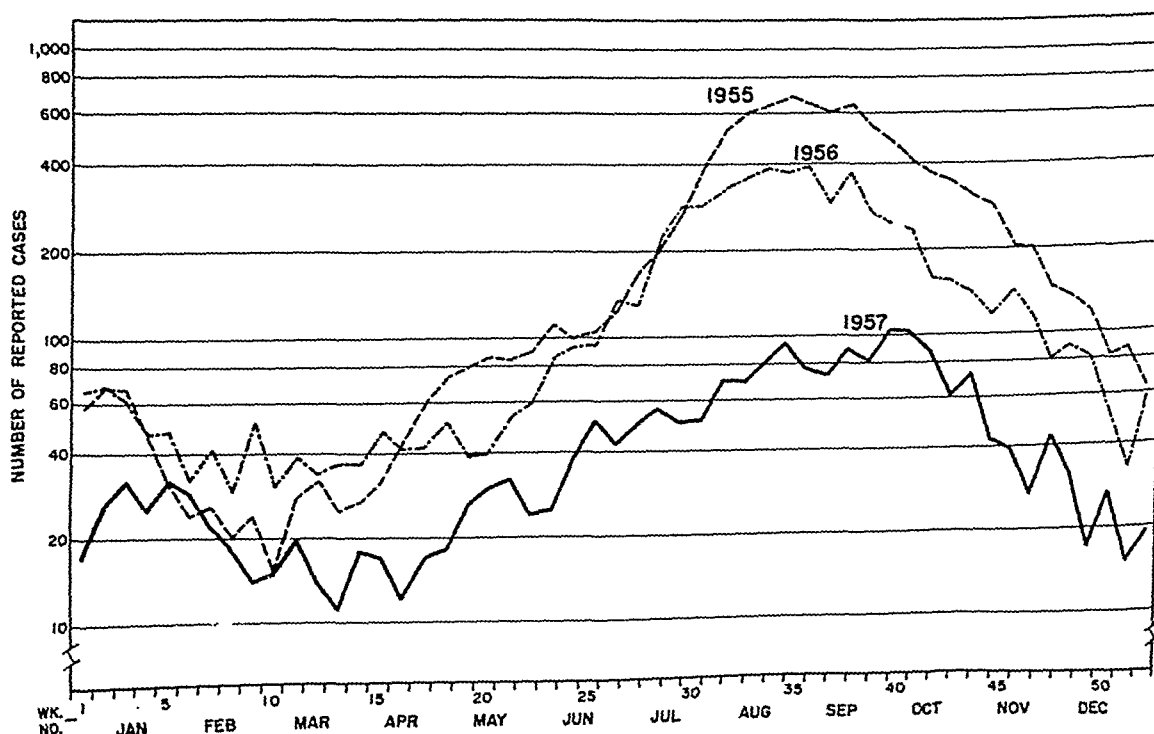
1957 when the lowest rates were among the 9- and 10-year-olds (fig. 4).

For nonparalytic poliomyelitis, in contrast with paralytic, the age distribution during 1957 was not appreciably changed from the pattern of 1952, 1955, and 1956 (table 3). The largest proportion of cases appeared in the 5- to 9-year age group, and the estimated age-specific attack rates for nonparalytic disease peaked approximately at ages 3 through 7.

See

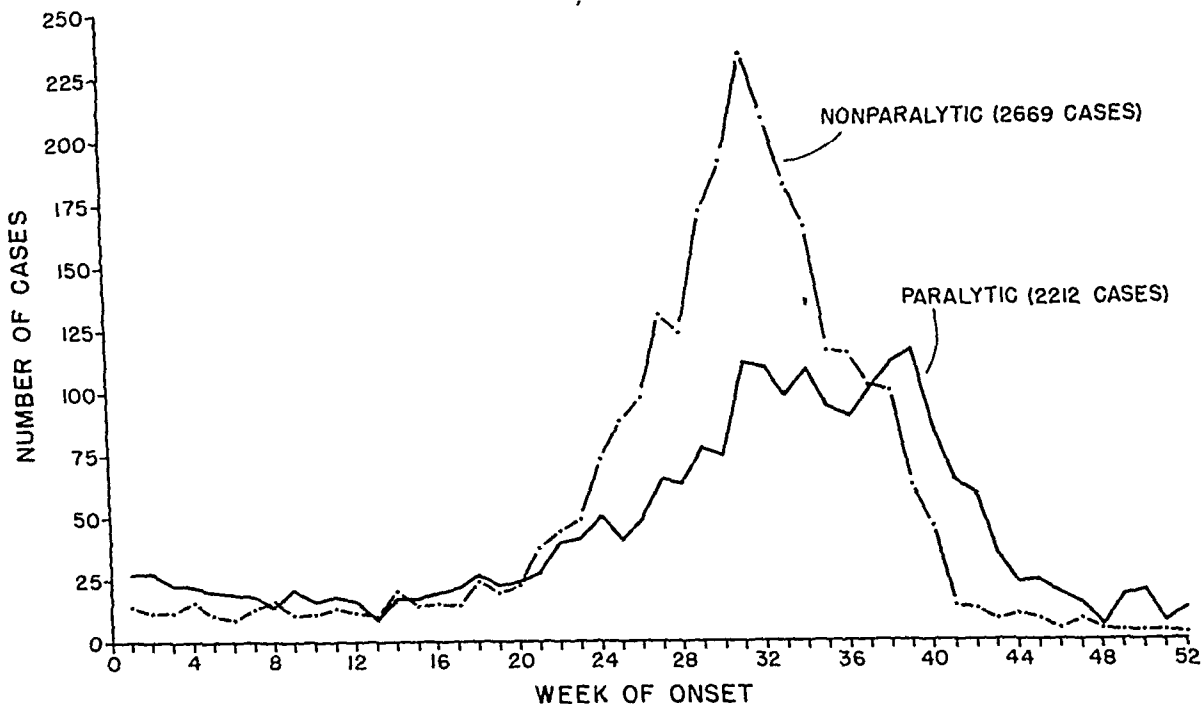
During 1957, just as in 1956 and in previous years, total poliomyelitis incidence in males exceeded that in females. In recent years, however, incidence in young adult females has tended to exceed that in males (3, 5). This pattern was seen in 1956 (4), when more cases occurred in females than in males at age 12 and ages 20 to 24. During 1957 the cases in females outnumbered the cases in males throughout the 20- to 40-year age group (table 4), but when corrections are made for the fact that the female population exceeds the male population

Figure 2. Paralytic poliomyelitis incidence in the United States, 1955-57.¹



¹ Data from the National Office of Vital Statistics, Public Health Service.

Figure 3. Seasonal incidence of poliomyelitis in the United States, 1957.¹



¹ Cases reported to the Poliomyelitis Surveillance Unit, Communicable Disease Center, Public Health Service.

in this age group, these differences are not so prominent.

Racial

Current age-specific attack rates cannot be derived by race since nationwide population estimates by race and age are not available beyond the 1950 census and since reporting of poliomyelitis by race is not a uniform practice.

Nevertheless, data from southern States and from several urban areas suggest that paralytic poliomyelitis attack rates in Negro populations are increasing both absolutely and relative to the rates in whites. Estimation of paralytic poliomyelitis attack rates by race in southern States in 1955 revealed the rate among whites to be 1.8 times that among nonwhites, while in 1957 the rate among whites was only 0.75 times that for nonwhites (6).

In the 1956 Chicago epidemic attack rates for paralytic poliomyelitis among Negroes were almost eight times those in whites (7,8). During 1957, the only large city with any concentration of poliomyelitis was Washington, D.C., where the paralytic attack rate in nonwhites was four

times as high as in whites. In 1956 and 1957, study of 14 additional urban areas reveals that 6 of these 14 experienced a similar increase in paralytic rates among nonwhites, in contrast with patterns of previous years. These areas were Philadelphia, Richmond, Norfolk, New York, Baltimore, and Atlanta.

Vaccination History

Evidence suggesting poliomyelitis vaccine effectiveness in the prevention of paralytic disease continued to accumulate during 1957. Table 5 presents by age group the proportion vaccinated of paralytic and nonparalytic cases reported during 1957 in the poliomyelitis surveillance program from 47 States and the District of Columbia. Since much of the nonparalytic illness was caused by nonpolioviruses against which the vaccine is ineffectual, it was expected that the proportion vaccinated among nonparalytics would be higher than among paralytics. This higher incidence among nonparalytics was observed in all age groups. An

Table 2. Poliomyelitis cases reported in 1956 and 1957 by State and paralytic status

State and region	1956					1957				
	Cases ¹			Rates ²		Cases ¹			Rate	Paralytic
	Para-lytic	Non-para-lytic	Unspe-cified	Para-lytic	Non-para-lytic	Para-lytic	Non-para-lytic	Unspe-cified		
United States.....	7, 911	6, 555	674	4. 7	3. 9	2, 499	2, 826	160	1. 5	
Northeast.....	684	680	66	1. 6	1. 6	192	213		. 5	
Maine.....	14	6		1. 6	. 7	4	4		. 4	
New Hampshire.....	3	12	1	. 5	2. 1	1	10		. 1	
Vermont.....	12	10		3. 2	2. 7	4	1		1. 1	
Massachusetts.....	48	52		1. 0	1. 1	11	14		. 2	
Rhode Island.....	2	7		. 2	. 8					
Connecticut.....	30	53		1. 3	2. 4	13	25		. 6	
New York.....	384	369	1	2. 4	2. 3	107	89		. 7	
New Jersey.....	91	111		1. 7	2. 1	29	52		. 5	
Pennsylvania.....	100	60	64	. 9	. 5	23	18		. 2	
North Central.....	2, 659	2, 827	267	5. 4	5. 7	713	1, 021	23	1. 4	
Ohio.....	313	262	3	3. 4	2. 9	122	101	6	1. 3	
Indiana.....	234	176		5. 3	4. 0	87	73		1. 9	
Illinois.....	1, 148	792	17	12. 2	8. 4	161	145	1	1. 7	
Michigan.....	308	348		4. 1	4. 6	121	377		1. 6	
Wisconsin.....	263	270	5	7. 0	7. 2	35	73		. 9	
Minnesota.....	78	87		2. 4	2. 7	34	32		1. 0	
Iowa.....	45	491	44	1. 7	18. 2	21	57		. 8	
Missouri.....	191	220	3	4. 5	5. 2	60	62		1. 4	
North Dakota.....	13	27	1	2. 0	4. 1	7	7	3	1. 1	
South Dakota.....	8	28	1	1. 2	4. 0	18	14	10	2. 6	
Nebraska.....	58	126	8	4. 1	8. 9	29	45	3	2. 0	
Kansas.....			185			18	35		. 8	
Northwest.....	295	239	18	4. 9	4. 0	66	41	12	1. 1	
Montana.....	38	17		6. 0	2. 7	5	5	2	. 8	
Wyoming.....	18	17	1	5. 6	5. 3	7	5		2. 2	
Idaho.....	63	31	16	10. 1	5. 0	6	7	10	. 9	
Washington.....	98	93	1	3. 7	3. 5	19	3		. 7	
Oregon.....	78	81		4. 5	4. 7	29	21		1. 6	
Southeast.....	997	849	98	3. 0	2. 5	621	506	71	1. 8	
Delaware.....	11	18		2. 7	4. 5	1	4		. 2	
Maryland.....	90	23		3. 2	. 8	33	7		1. 1	
District of Columbia.....	7	4		. 8	. 5	66	9		7. 9	
Virginia.....	151	86		4. 1	2. 4	69	38		1. 8	
West Virginia.....	60	48	5	3. 0	2. 4	39	18		2. 0	
North Carolina.....	179	136		4. 0	3. 1	52	181		1. 2	
South Carolina.....	46	67		2. 0	2. 8	66	41	21	2. 8	
Georgia.....	101	85	1	2. 7	2. 3	71	10	12	1. 9	
Florida.....	103	169	92	2. 7	4. 5	39	57	38	1. 0	
Kentucky.....	84	112		2. 8	3. 7	68	39		2. 2	
Tennessee.....	103	60		3. 0	1. 7	68	92		2. 0	
Alabama.....	62	41		2. 0	1. 3	49	10		1. 6	
South Central.....	1, 573	1, 010	120	8. 7	5. 6	533	603	21	2. 9	
Mississippi.....	184	75	35	8. 7	3. 5	30	38	15	1. 4	
Arkansas.....	146	76		8. 0	4. 2	25	25		1. 4	
Louisiana.....	414	194		13. 8	6. 5	74	95		2. 4	
Oklahoma.....	93	94	33	4. 1	4. 2	35	80	6	1. 5	
Texas.....	736	571	52	8. 2	6. 4	369	365		4. 0	
Southwest.....	1, 703	950	105	9. 5	5. 3	374	442	33	2. 0	
Colorado.....	87	68	3	5. 4	4. 2	26	22	1	1. 6	
New Mexico.....	37	21	26	4. 5	2. 6	19	10	21	2. 3	
Arizona.....	65	61	1	6. 1	5. 8	22	18		1. 9	
Utah.....	145	24	58	17. 9	3. 0	12	10	11	1. 4	
Nevada.....	13	6	17	5. 3	2. 4	1	3		. 4	
California.....	1, 356	770		10. 1	5. 7	294	379		2. 1	
Alaska.....	7	2	2	3. 3	1. 0	3	1		1. 5	
Hawaii.....	45	17		7. 7	2. 9	9	1		1. 5	
Puerto Rico.....	48	6		2. 1	. 3	40	4		1. 8	

¹ Source: National Office of Vital Statistics, Morbidity and Mortality Weekly Report, vol. 5, No. 53, Oct. 23, 1957, and vol. 6, No. 53, Oct. 29, 1958.

² Rates per 100,000 population based on population estimates by the Bureau of the Census.

Table 3. Percentage distribution of paralytic and nonparalytic poliomyelitis cases by age group ¹ 1952,² 1955,² 1956,³ and 1957 ⁴

Age group, in years	Paralytic				Nonparalytic			
	1952	1955	1956	1957	1952	1955	1956	1957
0-4	29	32	42	44	21	19	21	17
5-9	25	21	16	18	31	29	26	28
10-14	13	12	11	9	16	17	16	16
15-19		7	7	6		8	10	11
20-29	33	16	15	13	31	16	18	18
30 and over		11	9	10		9	9	10
Total percent	100	99	100	100	99	98	100	100
Total cases	13, 552	9, 564	7, 399	2, 262	8, 321	8, 775	6, 269	2, 698

¹ Based on data reported to Poliomyelitis Surveillance Unit in the age distribution analysis. Cases in which paralytic status was not specified are excluded.

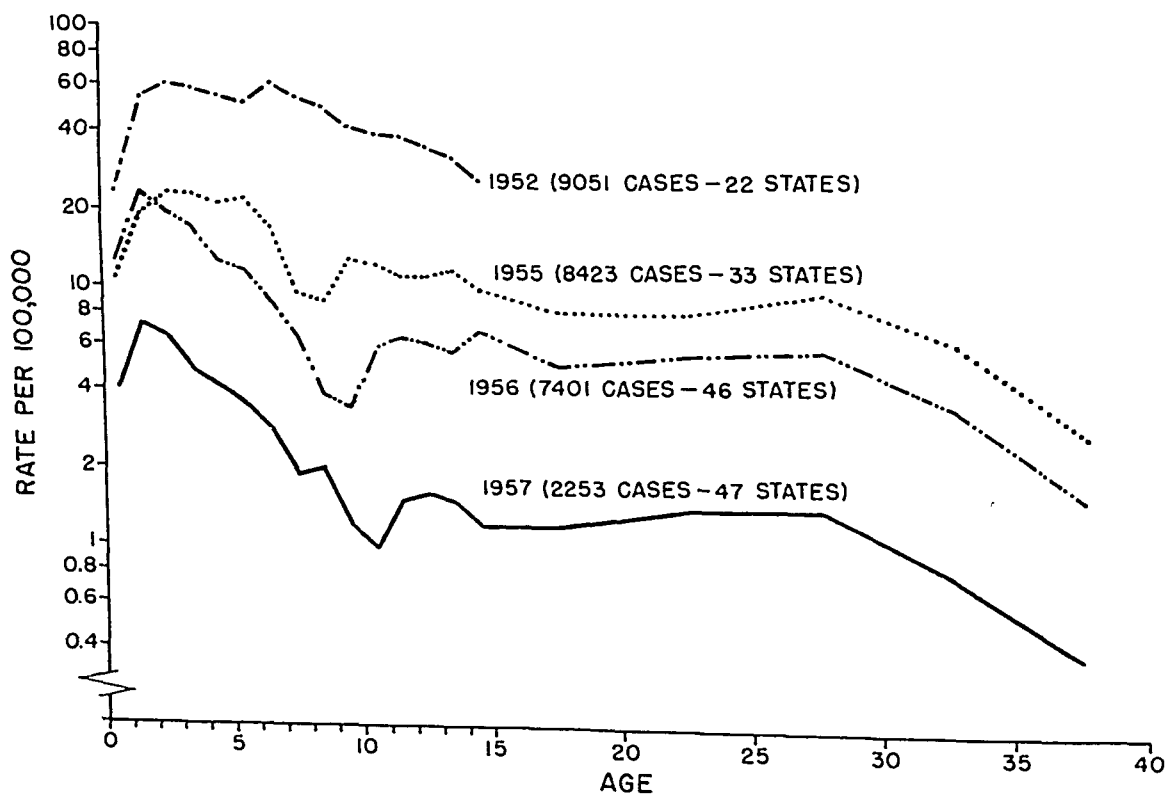
² 1952 data from 22 States and District of Columbia and 1955 data from 33 States and District of Columbia

previously presented in reference 3.

³ 1956 data from 45 States and District of Columbia, reference 4.

⁴ 1957 data from 47 States and District of Columbia.

Figure 4. Age-specific attack rates for paralytic poliomyelitis in the United States, 1952 and 1955-57.¹



¹ Cases reported to the Poliomyelitis Surveillance Unit, Communicable Disease Center, Public Health Service.

Table 4. Paralytic poliomyelitis cases in the United States in 1957, showing age distribution by sex ¹

Age group, in years	Males	Females
0-4	581	424
5-9	233	171
10-14	118	80
15-19	79	56
20-24	65	78
25-29	74	76
30-34	48	49
35-39	24	27
40 and over	42	26
Unknown	1	1
Total	1,265	989

¹ Cases in which sex was unknown were omitted.

SOURCE: Data reported to Poliomyelitis Surveillance Unit from 47 States and the District of Columbia.

overall total of 54 percent of nonparalytic cases had received some vaccine as compared with 30 percent of paralytic cases.

The ability of the vaccine to modify the clinical characteristics of the disease is indicated in the correlation which exists between number of doses received and absence of paralysis. Whereas 56 percent of all nonvaccinated poliomyelitis cases were paralytic, only 25 percent of all triply vaccinated cases were reported paralytic.

Data obtained in August and November of 1957 for the Poliomyelitis Vaccine Activity Unit by NOVS through a supplement to the Census Bureau's Current Population Survey permitted an estimate of the vaccination status

of the United States population by age group. This analysis was under the direction of Dr. Monroe Sirken, chief, Actuarial Analysis Section, National Office of Vital Statistics. Using as numerators the vaccination history of cases of paralytic poliomyelitis reported by age groups in the poliomyelitis surveillance program and as denominators the above United States population estimates by age group and vaccination status, rough calculations of paralytic poliomyelitis attack rates were derived in vaccinated and unvaccinated populations. The estimated paralytic poliomyelitis rates were lower in the triply vaccinated than in the unvaccinated population (table 6). The percentage reduction ranged from 90 percent in the 0-4 year age group to 54 percent in the 20-29 year age group.

Such estimates represent uncontrolled comparisons of ratios rather than measured attack rates in controlled populations, and as such are subject to many potential errors. Such factors as variations in the vaccine status in different areas, ages, and population groups, and variations in the actual exposure to virus in individual groups should be taken into account in analyzing effectiveness of vaccine. Various studies are in progress at the present time to evaluate vaccine effectiveness in more controlled population subgroups.

Triply Vaccinated Cases

Cases occurring in triply vaccinated persons during 1957 included 207 paralytic, 588 nonparalytic, and 1 unspecified case. Of these, lab-

Table 5. Paralytic and nonparalytic poliomyelitis in the United States in 1957, by age group and vaccination history ¹

Age group, in years	Paralytic			Nonparalytic		
	Total cases	One or more doses	Percent vaccinated	Total cases	One or more doses	Percent vaccinated
0-4	970	246	25	434	212	49
5-9	394	198	50	742	550	74
10-14	198	93	47	417	311	75
15-19	132	37	28	293	125	43
20 and over	492	84	17	733	221	30
Total	2,186	658	30	2,619	1,419	54

¹ Omitting cases in which vaccination status or age was not reported.

SOURCE: Data reported to Poliomyelitis Surveillance Unit from 47 States and the District of Columbia.

Table 6. Paralytic poliomyelitis cases¹ in the United States, 1957, attack rates among triply vaccinated and nonvaccinated persons, and estimates of vaccine effectiveness²

Age group, in years	Paralytic cases		Attack rates		Percent effectiveness
	Not vaccinated	3+ doses	Not vaccinated	3+ doses	
0-4	724	59	92.8	9.6	90
5-9	196	88	56.5	9.2	84
10-19	200	45	23.6	4.4	81
20-29	232	12	16.0	7.4	54
30-39	115	2	6.4	1.3	79
Total	1,467	206	28.2	7.1	75

¹ Cases reported to the Poliomyelitis Surveillance Unit.

² Population estimates of triply vaccinated and nonvaccinated persons provided by Dr. Monroe Sirken, chief, Actuarial Analysis Unit, NOVS, Public Health Service.

oratory data were reported on 85 paralytic cases and 171 nonparalytic cases (table 7). Studies were negative in the large majority of these cases; only 19 percent of the paralytic and 15 percent of the nonparalytic cases studied were confirmed as exhibiting current or recent infection with poliovirus, while other viruses were isolated in 10 percent of the paralytic cases and in 20 percent of nonparalytic cases.

Data regarding the extent of paralytic involvement remaining after convalescence were

Table 7. Poliomyelitis cases in triply vaccinated individuals in 1957, as indicated in laboratory studies

Type of disease	Paralytic		Nonparalytic	
	Cases	Percent of total tested	Cases	Percent of total tested
Poliomyelitis 1	6	7	11	6
Poliomyelitis 2			6	4
Poliomyelitis 3	10	12	7	4
Poliomyelitis, type unspecified			1	1
Coxsackie	6	7	15	9
ECHO	1	1	10	6
Unidentified virus	1	1	10	6
Negative	61	72	111	65
Total	85	100	171	101

Source: Data reported to the Poliomyelitis Surveillance Unit from State and local health departments, from research laboratories, and from laboratories of the Virus Diagnostic Unit of the Communicable Disease Center, Public Health Service.

Table 8. Paralytic poliomyelitis cases in triply vaccinated individuals in the United States during 1957, showing severity of residual paralysis as indicated in laboratory studies

Estimated severity	Polio-virus iso-lated	Cox-sackie iso-lated	Nega-tive labora-tory results	No labora-tory study	Total
Severe	17	1	15	19	42
Moderate	3	3	10	23	39
Mild	4		21	29	54
Total	14	4	46	71	135

¹ Including one fatality.

SOURCE: Data reported to the Poliomyelitis Surveillance Unit.

submitted by physicians in 135 cases (table 8). Residual paralysis was roughly estimated to be severe in 42 cases, moderate in 39, and mild in 54 cases. Of the severe cases poliovirus infection was confirmed in 7 and laboratory studies were negative in 15.

During 1957 three deaths from poliomyelitis were reported in triply vaccinated persons. Pathological findings were characteristic of acute poliomyelitis in one case from which type 3 poliovirus was isolated. In a second case, pathological findings were suggestive but laboratory studies were negative. The remaining fatal case was *not confirmed*; postmortem examination was not performed, and no material for virus isolation was available.

Vaccine Distribution

During the period April 1955 through December 1957, a cumulative total of 186.2 million cc. of net bottled poliomyelitis vaccine was distributed for domestic use. This total includes 27.7 million cc. shipped during the period April–December 1955, 70 million in 1956, and 88.2 million in 1957. In addition, 19.2 million cc. were exported during the period August 1956 to December 1957. During 1957, shipments lagged considerably behind releases, and a balance of 33.1 million cc. was cleared by the National Institutes of Health but not shipped by the end of the year. Distribution of vaccine by calendar quarters is presented in figure 5.

Vaccine Safety

Reporting of cases occurring within 30 days of a poliomyelitis vaccine inoculation was less thorough during 1957 than in 1955 and 1956. Analysis of 36 cases in 1957 with complete data revealed no tendency for the onset of illness to group in the 4- to 11-day period following inoculation. Onset of paralysis occurred in the inoculated limb in six cases and in the opposite uninoculated limb in four cases during 1957. No specific vaccine lot was known to be associated with more than three paralytic cases. The 1955 Cutter cases, in contrast, were associated with a small number of specific lots, and paralysis usually began in the inoculated limb 4 to 11 days following vaccination (1).

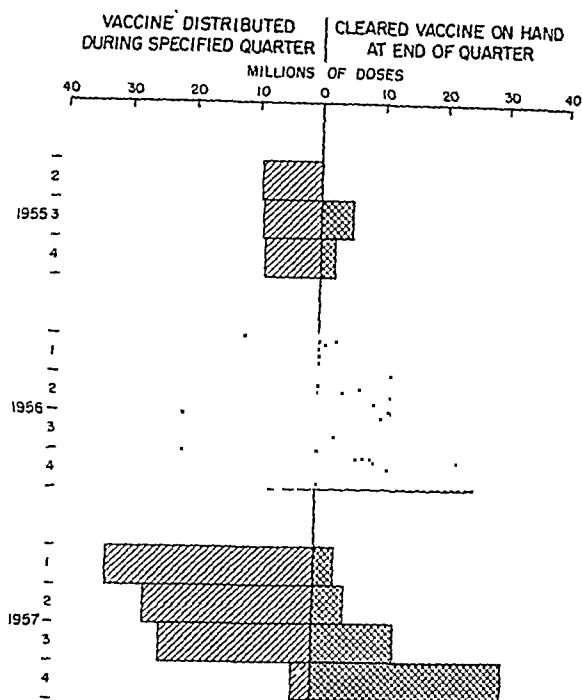
Discussion and Summary

Reported incidence of poliomyelitis in the United States during 1957 reached the lowest level since 1942. There were no major poliomyelitis outbreaks, and attack rates, particularly of paralytic disease, were low in all regions of the country.

Concurrently, during 1957 almost 90 million cc. of poliomyelitis vaccine were shipped in this country, bringing to over 180 million cc. the total vaccine distributed for domestic use since April 1955. More than half of our population has now received at least one dose of vaccine.

The extremely low incidence for paralytic poliomyelitis of 1.5 cases per 100,000 during 1957 is impressive in view of the extensive use of vaccine. However, marked annual variations have characterized poliomyelitis incidence

Figure 5. Poliomyelitis vaccine distribution, 1955–57.¹



¹ Data from Poliomyelitis Vaccine Activity Unit, Bureau of State Services, Public Health Service.

in this country in recent years. Furthermore, response to commercial poliomyelitis vaccine has been variable (9), and vaccinated subjects appear to be readily susceptible to gastrointestinal infection upon natural exposure to poliovirus (10–12). Therefore, it cannot be concluded that the widespread use of vaccine was alone responsible for the low total incidence of the disease during 1957. Final evaluation of the effect of inactivated poliomyelitis vaccine on poliovirus ecology and on total poliomyelitis incidence will require continued study over the next several years.

Changes in epidemiological patterns may nevertheless reflect the size and character of the vaccinated population since the Nation is not uniformly vaccinated. It has, therefore, become of increasing importance to continue detailed study of epidemiological trends of poliomyelitis in this country.

The striking change in age distribution pattern of paralytic disease observed during 1956 continued through 1957, with preschool children accounting for the largest proportion of cases

and with peak age-specific attack rates encountered in 1-year-old infants. Since the preschool ages were less thoroughly vaccinated than older children, it is probable that this change in the relative age distribution is at least in part a result of the vaccination programs. The trough in age-specific attack rates for paralytic poliomyelitis noted in 1955 among 7- and 8-year-olds and again in 1956 among 8- to 9-year-olds has persisted this year among the same cohort, now 9 and 10 years of age. Since this group in particular was thoroughly vaccinated in the school programs of 1955, the persistence of lowest paralytic attack rates in this population for 3 years suggests both effectiveness of the vaccine and duration of the induced immunity over the 3-year period.

Relatively and absolutely increased incidence of paralytic poliomyelitis was encountered during 1956 and 1957 among nonwhite racial groups in the south and in several metropolitan areas throughout the country.

Paralytic poliomyelitis cases tended to occur among unvaccinated individuals during 1957. Examination of vaccination history for paralytic cases in comparison with the estimated vaccination status of the United States population has permitted gross but reasonable estimations of paralytic attack rates in vaccinated and unvaccinated populations. The rate of paralytic disease in the triply vaccinated group was apparently reduced compared with that in unvaccinated populations. Further, a progressively lower incidence was recorded for those who had received 1, 2, or 3 doses of vaccine. These variations in calculations of effectiveness of three doses of vaccine reflect the unequal exposures of populations to virus and differing vaccination status of specific groups. The estimates are useful in determining the range rather than the specific degree of effectiveness.

Poliomyelitis vaccine shipments declined during the latter part of 1957. It is evident that increasingly active immunization programs will be required in order to achieve completion of the requisite three-dose schedule in large segments of the population as yet incompletely

vaccinated. Particular effort will be necessary in groups at relatively increasing risk, including the preschool ages and nonwhite populations.

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Youth is the period of building up the habits, hopes, and faiths. Not an hour but is trembling with destinies.—JOHN RUSKIN.

Federal Interest in Juvenile Delinquency

AIMS C. McGUINNESS, M.D.

MANY American children grow up in a rough world. They come from homes broken by desertion, divorce, or separation, or are children of unwed mothers. These, generally, are the youngsters, deprived of a father's support, who are dependent upon the Federal-State aid to dependent children programs for the bare necessities of life. Throughout the Nation there are more than 2 million of these children.

There are many pressures. Thousands of children under 12 years of age, whose mothers work full time away from home, have no daytime afterschool supervision. There is no telling how many children live in undesirable neighborhoods with substandard housing. Every year millions of children change schools, moving from State to State, from town to town, or into different neighborhoods. Many children, of course, grow up in combinations of these unfortunate situations, these pressures.

And from their numbers come many of the disturbed children, the youngsters in conflict with the law, members of what has been called "the shookup generation."

Police currently handle more than 1.7 million cases of juvenile misbehavior a year. About a quarter of these, or 428,000, are referred to the juvenile courts by police; an additional 175,000

delinquency cases are referred to juvenile courts by parents, teachers, or social agencies, making a total of more than 600,000 delinquency court cases every year.

Their number grows. The delinquency cases handled by the juvenile courts increased by 137 percent between 1948 and 1957, whereas the child population from 10 to 17 years of age increased only 28 percent.

By 1965 there will be an estimated 30 million children in the United States in this high-risk, vulnerable age group, a third more than in 1957. If the incidence of juvenile delinquency continues to increase at the same rate as it has since 1948, then by 1965 the juvenile courts will be handling delinquent children at an annual rate of about a million cases. And by then, police will be handling a much greater number, many of which will never reach the courts.

There isn't any simple solution, as we all know. But we know, too, that juvenile delinquency has reached perilous proportions. Two things urgently need doing: first, we must arouse ourselves and our communities to get on with the job of doing those things that could and should be done now, and second, we must pursue with vigor the search for better understanding of the basic conditions which lead to this fearsome complex of social behavior.

Cooperative Efforts Needed

Successful efforts to combat juvenile delinquency require cooperation. It is a job for a number of people: the parents and relatives,

Dr. McGuinness is special assistant to the Secretary for Health and Medical Affairs, Department of Health, Education, and Welfare. He presented the full text of this paper before the Michigan Branch of the American Academy of Pediatrics in Detroit, March 10, 1959.

Standard Family Court Act

Family courts would take the place of separate juvenile and domestic relations courts in model State legislation developed by the National Probation and Parole Association in cooperation with the Children's Bureau, Department of Health, Education, and Welfare, and the National Council of Juvenile Court Judges.

The model legislation, entitled the "Standard Family Court Act," was published in April 1959, in the *Journal of the National Probation and Parole Association*, as the culmination of a 4-year project.

The need for a unified court approach to family problems has been indicated by various students of judicial procedure since early in this century. The new standard act represents a radical departure from previous model legislation by bringing together, under the jurisdiction of a single court, the major legal issues and problems of a personal nature which arise within families.

The family court, as proposed, would be set up on a statewide basis and would include a corps of specialized services within each court to treat such problems as delinquency and neglect, as well as provide special services in cases involving divorce, legal separation, support, adoptions, and certain criminal actions involving adults who commit offenses against children or other members within a family.

The new proposal, for the use and implementation by State legislatures, spells out the duties and responsibilities of the court as well as its relationship to other agencies. It sets up safeguards around the rights of parents and children in its provisions for legal counsel and in certain limitations it places on the court's procedures and disposition powers.

Specifically prohibited by the act would be transfer of a delinquent child to an institution for adult criminals; placement of a neglected child in an institution for delinquents; and subjecting a child to criminal court penalties and juvenile court control for the same offense.

The organizational pattern of the family court act would permit the establishment on a national basis of an accurate count of the number of children and families in trouble. Statewide reporting exists now in several States but not on a unified basis.

the doctor, the psychologist, the teacher, the social worker, the minister, the lawyer, and the police. And it is a job for citizens groups, voluntary organizations, and government at all levels, local, State, and Federal. The main work, of course, must be done in the communities, for troubled youngsters must be reached in person, in their homes, their churches, their schools, or on streets and back alleys, if that's where they are.

At the same time, juvenile delinquency is a matter of State and Federal concern. Because it is a highly complicated problem, many diversified approaches are required in its solution. In one way or another, it is of concern to virtually every unit of the Department of Health, Education, and Welfare.

The Children's Bureau, with responsibility for helping improve the conditions under which children are born and grow up, has a particular concern for those youngsters in conflict with society. In 1955 it established the Division of Juvenile Delinquency Services, whose staff members on request give professional consultation to juvenile courts, probation officers, police, youth commissions and councils, and citizens' organizations in cities and counties all over the country.

An important function of this unit is the development, in consultation with State and local authorities, of standards and guides for the use of professional personnel and agencies concerned with juvenile delinquency. A much-needed standard for the use of juvenile courts has been completed. In cooperation with the National Probation and Parole Association and the National Council of Juvenile Court Judges, the Children's Bureau is now working on a revision of the family and juvenile court acts.

As in the past, the Children's Bureau is the focal point in the Federal Government for initial planning of the White House Conference on Children and Youth. This historic conference, which has been called by the President of the United States in every decade in this century, will concern itself in 1960 with lasting values in the changing world. The problems of juvenile delinquency undoubtedly will have an important place in the program.

Between now and 1960, communities, States, and the Federal Government will be examining

how our changing world is affecting children. Specifically, study groups will explore such things as family, religion, and the arts. They also will look at community organizations and services as they impinge on the life of the child. In addition, they will inquire into the manner in which the behavior of adults, in their interactions with children and youth, deter or foster individual fulfillment and constructive services to humanity.

I am sure the many studies leading up to the conference will give us valuable new insights into the ultimate solution of juvenile delinquency prevention.

Prevention Main Objective

Prevention is the central objective of many other Federal activities that bear directly or indirectly on the question of juvenile delinquency. In 1956, the President called the first Conference on Fitness of American Youth, and subsequently created the President's Council on Youth Fitness and a Citizens' Advisory Committee to that council. For the past 2 years it has been my privilege to represent the Department of Health, Education, and Welfare on the Interagency Advisory Group to the Council.

The President has thus brought together many creative minds and new energies for a single purpose: to stimulate and encourage the building of men and women of physical, moral, and spiritual strength.

In the words of Homer C. Wadsworth, of Kansas City, chairman of the Citizens Advisory Committee, "The Council should serve three main purposes: (a) to continue to alert the American people to the need for special emphasis on the fitness of American youth; (b) to act as a clearinghouse for information on activities proven to be especially effective in this regard; and (c) to encourage a more effective coordination of public and private services in our communities designed to promote youth fitness."

These and other related activities are bound to bring enormous benefit to our children and young people. A really heartening advance was made for children when Congress last fall amended the Social Security Act to authorize the Children's Bureau to provide welfare serv-

ices for children in urban areas on the same basis as for rural children, services that will help to keep children in their homes and strengthen family life; that protect babies who are going to be adopted; that provide good foster homes when necessary; that help children in danger of becoming delinquent. This is the first time that Federal funds have been authorized to augment and strengthen local and State public and voluntary efforts.

In 1956, Congress amended the Social Security Act to give emphasis to social services in public assistance programs that lead, importantly, to the strengthening of family life and that help stimulate city and community efforts to help families and individuals get back on their feet and to tap all sources of help for families in trouble.

By incorporating in the legislation the word "services," Congress gave a powerful incentive to the States to move in the direction of prevention of human disasters that so frequently happen when a family undergoes a social breakdown. To move in the direction of helping people off assistance rather than helping people on assistance is the goal toward which all these programs must strive.

The Family Approach

The family approach to social problems is of real significance in the treatment of juvenile delinquency. Disturbed youngsters often come from disturbed families. And when we, as a Nation, are able to do a better job of reaching these multiproblem families, we will have come a long way in helping prevent juvenile delinquency and other social ills. Among the individual members of these families will be found not only juvenile delinquency but combinations of all the other problems that confront our society today: mental illness, physical disability, alcoholism, unmarried parenthood, broken homes, prostitution, drug addiction, and many others. These are the marginal families, dependent or potentially dependent. Their children are in "clear and present danger."

It should be emphasized that multiproblem families are not confined to low-income groups. There are probably as many multiproblem

families among the self-supporting as there are among families on public assistance. Problems of a family often first show up on hospital records, when an illegitimate baby is born or a mentally ill person is identified, or on police records, when a youngster comes in conflict with the law, or even on school records, when a child is consistently truant or an academic failure.

No one, of course, knows just how many of these families there are. But from a recent analysis of 25 cities based on records of official agencies, we get a rough idea of the number of families that have undergone a social breakdown. In half the cities the rate was 67 families per 1,000. Eastern and northern cities showed a rate between 29.4 and 78.3 families per 1,000. Southern cities had a uniformly higher rate.

These families are not all in hiding. Many are known to social agencies, teachers and the clergy, and members of our profession, and they are frequently known to the police. It makes sense to bend every effort to reach a family before it becomes dependent, or failing that, to help a swamped family get back on its own feet, emotionally and financially.

And that again is what the Department is trying to foster through its new emphasis on social work in the public assistance programs. This approach is gaining momentum all the time. But the full potential of public assistance programs will be approached only when all the resources of the community, public and private, that could possibly be of help to families in trouble are brought together in an organized way to bear upon immediate problems.

Program Interrelationship

In this and other programs of the Department, we seek to destroy the seeds of social evils before they have had a chance to germinate. The programs are interwoven, interrelated.

The Office of Education, alerted to the role that schools can play in identifying and helping delinquents or potential delinquents, has contracted with a number of universities and colleges for research studies on various aspects of juvenile delinquency in its relation to education.

One of the provisions of the new National

Defense Education Act should have an extremely beneficial effect in the prevention of juvenile delinquency. This is the title that sets up a nationwide system of testing, backed up by counseling and guidance programs. It seems to me that when special talents in boys and girls are identified when they are young, and when they are encouraged to pursue these talents and make the most of themselves, there will be a good deal less risk that they will become members of street gangs or get in trouble with the law. School counselors in many cases should be able to identify potentially delinquent children and bring community resources to bear on their problems in time to prevent real trouble.

The Public Health Service is intensifying its efforts in areas of mental health, with a number of significant programs relating to juvenile delinquency. Important fundamental work was done last year by scientists of the National Institute of Mental Health toward clarifying some of the basic mechanisms of psychological development and human behavior.

It is very encouraging to note the widespread expansion of community mental health programs. A high share of the cost of these programs is being provided by State and local resources. An alltime high of \$54 million was expended, from all sources, for these purposes during the past year, but only 7.4 percent of this represents Federal funds.

Delinquency In Perspective

I think, in any discussion of juvenile delinquency, we should put statistics in perspective. Not all of our children are growing up to be troublemakers. Most parents do a good job. Churches of all denominations have a large membership among children and young people. And our schools and numerous youth-serving organizations are doing a commendable job in promoting good citizenship.

But for those children who are delinquent, or likely to become so, we have an obligation to do what we can, when and where we can, and to start doing it now!

From its earliest days, our Nation has been a symbol of freedom to the rest of the world, freedom to stretch our minds in the way they incline, freedom of opportunity. Of the

world's 2½ billion people, somehow our Nation of 175 million has managed to accumulate almost half of the world's wealth.

We have the resources and much of the know-how to end hunger and scarcity and poverty and disease, and to slash out at social evils that have beset mankind through the ages. We have the resources to encourage more intellectual attainment among more young people. In our

own generation we could bring untold benefit not only to ourselves and our children, but to future generations of all people of the world.

Surely, amidst our plenty, we can realize the sheer practicality and find the resources of time, energy, money, and creative thinking to help these thousands of boys and girls in our society whom society, in some way, has failed and whom we have tagged "delinquent."

Protection of Dairy Products

As a result of developments such as the mass production of penicillin and of chlorinated hydrocarbon pesticides and the widespread use of these chemicals on the farm, interstate concern with milk has multiplied. In 1949, the Department of Agriculture joined the Food and Drug Administration in advising farmers that sprays containing DDT should not be used on milk cows or in dairy barns. These uses have largely been discontinued.

We have found that when a cow eats feed that contains DDT, she excretes the pesticide in her milk. Most of the other chlorinated hydrocarbons also leave poisonous residues in milk when used on the cow or her feed.

When penicillin is infused into the cow's udder to treat mastitis, it comes out in the milk for a considerable period of time. Some farmers are using chlorinated hydrocarbons and penicillin improperly and residues of these chemicals are showing up in milk. Although the residues are very small, they cannot be tolerated.

Our limited surveys of milk conducted in 1954 and 1955 disclosed that 3 percent of the 1954 samples and more than 11 percent of the 1955 samples contained minute quantities of penicillin. A larger survey in 1956 covering the entire country showed similar penicillin residues in about 6 percent of the samples.

In our nationwide survey of market milk for pesticide residues in 1955, quantitative chemical tests on 169 samples believed to have

highest insecticide residues (based on earlier bioassay) showed 33 samples with residues ranging from 0.05 to 1.5 ppm of DDT, or its equivalent.

Remedial steps we have taken since then include the requirement that penicillin-containing drugs for treating mastitis by infusion into the cow's udder must bear a warning on the label itself that milk from treated cows should not be used as food for 72 hours after the treatment; formerly, this warning might appear only on the circular shipped with the drug. The penicillin content of mastitis treatments is now limited to 100,000 units per dose; formerly much larger amounts were being used.

A recent nationwide survey gave the following preliminary findings:

- Around 0.1 ppm of chlorinated hydrocarbons by chemical tests in about 4 percent of almost 800 market milk samples tested. The more sensitive bioassay shows a higher percentage of samples with residues.

- Penicillin residues in 3½ percent of more than 1,100 samples tested. When the positive samples were averaged, the penicillin content was approximately 0.1 unit per milliliter of milk. (These percentage figures are not strictly comparable with those obtained earlier because of some variation in sampling procedures.)

It is clear that there has been significant improvement in the milk supply. This reflects sincere, extensive efforts.

—Excerpt from a speech delivered by George P. Larrick, Commissioner of Food and Drugs, at the Dairy Products Improvement Institute in New York City, February 19, 1959.

Although automobile exhaust contains dozens of compounds, only a limited number of these are a potential public health hazard.

Health Hazards of Automobile Exhaust

JOHN R. GOLDSMITH, M.D., M.P.H., and LEWIS H. ROGERS, Ph.D.

THE GASES, vapors, and particles in automobile exhaust are considered by many to be the major contributing factors of Los Angeles' air pollution, which is so strikingly characterized by irritation of the eyes (1,2). Other west coast cities, including San Diego and San Francisco, appear to have a similar problem in less severe form. We have learned that when the nitrogen oxides and partly burned fuel of automobile exhaust are irradiated the characteristic photochemical type of smog is produced (3). Concern regarding this form of air pollution derives both from the widespread symptoms and from the possibility of immediate or long-term effects on health (4). If attention is focused on hydrocarbons and nitrogen oxides, in an effort to abate eye irritation, other adverse effects of automobile exhaust may unfortunately be ignored. This review attempts to place these other effects in perspective.

When only a few automobiles are driven on country roads, there is no public health problem, but when thousands of cars are operated in a small area with a limited supply of fresh air, automobile exhaust may constitute a potential hazard to the health of the community. This will be true even in the absence of irritated eyes and reduced visibility, so characteristic of photochemical smog.

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The solution of two imperative questions lies in the future: How much exhaust can be tolerated in how much air? When does this potential hazard become an actual one? For the present, we shall concern ourselves with what is known about the constituents of automobile exhaust and with an approach to answering these questions.

Composition of Automobile Exhaust

We are confining our attention to air pollution from spark-fired internal combustion engines and excluding that from diesel engines. In most urban areas, the latter, although sometimes a local nuisance, is of lesser importance to the community. In Los Angeles, for example, the air pollution from diesel engine exhaust is about 20 tons of organic emissions per day, whereas auto exhaust contributes about 1,200 tons of organic emissions per day (5).

When a petroleum fuel is completely burned, the products are carbon dioxide and water, together with nitrogen and unused oxygen from the air. However, in a spark-fired internal combustion engine some of the nitrogen is also oxidized producing the several oxides of nitrogen. In automobiles the ratio of air to fuel is seldom maintained at the theoretical value of 15:1 required for complete combustion. More frequently, this ratio amounts to about 12:1 at idling and 13.5:1 at cruising.

Under these conditions, other products appear in the exhaust, including carbon monoxide, hydrogen, aldehydes, and unburned hydrocarbons. In addition, oxides of sulfur occur in

exhaust depending on the amount of sulfur in the fuel, and lead compounds are present in a form determined by the additives used in the fuel. Because of tremendous differences in operating conditions, condition of cars, and other factors, it is difficult to give representative analyses. Some characteristic ranges of exhaust gas composition are presented in table 1. Of the constituents listed in table 1, we shall consider only hydrocarbons, oxides of nitrogen, lead compounds, and carbon monoxide.

Effects of Time and Weather

Since the composition of exhaust gas is so variable and is quickly diluted several hundred-fold when it is released to the atmosphere, knowing the actual concentrations of exhausted gases in the atmosphere is important. These concentrations are affected by windspeed, presence and intensity of a temperature inversion; vehicle operating conditions, number of automobiles operating per square mile, and further reactions of the atmospheric constituents. To illustrate how high the concentrations may become, table 2 shows values of hydrocarbons and carbon monoxide at five busy intersections in Los Angeles during peak traffic and adverse weather conditions.

About 5,000 vehicles per hour passed the intersections at which the samples were taken except at Hollywood and Harbor Freeways, where about 11,000 per hour passed.

Community and Industrial Exposure Hazards

The substances listed in table 1 have been subject to conventional toxicological studies, especially from the viewpoint of occupational hazards (9-11). Although the toxicological procedures are well established there are several reasons why this approach is inadequate for our purposes.

Industrial exposure standards are usually determined by the American Conference of Governmental Industrial Hygienists. These standards, called "threshold limits," are based upon exposures of healthy adults to a single substance for a period not to exceed 8 hours followed by a recovery period of at least twice that long. In community air pollution from auto-

mobile exhaust, concentrations vary from hour to hour, but the exposure may be continuous, both in time and, for most persons, in place. Coming home from work does not mean an end of exposure to air pollution and may mean a great increase if the trip requires driving during peak traffic.

The extent to which exposure to one or more of the substances in automobile exhaust increases the effect of another is not known. Concern over this possibility is heightened by some examples of synergistic effects. Amdur (12) has shown the extent to which aerosols enhance the effects of SO₂ on the pulmonary airway flow resistance in guinea pigs, and Falk (13) has shown the effect of soots on deposition of carcinogens. Until further studies have clarified such interactions, it is necessary to suspect that components of exhaust may have synergistic effects.

While industrial exposures usually involve small numbers of relatively healthy people, community exposures affect, in varying ways, the entire population of a community, the sick with the well, the frail with the vigorous. In sufficient concentrations, exhaust from automobiles may lead to morbidity or even mortality in the sick and frail segment of the population whereas the same exposure might not noticeably affect healthy and vigorous persons. For persons with circulatory failure or with reduced competence of cerebral or myocardial circula-

Table 1. Composition of automobile exhaust

Constituent	Percent of concentration (volume/volume)	
	Minimum	Maximum
Aldehydes.....	0	0.03
Carbon dioxide.....	5	15
Carbon monoxide.....	0.2	12
Hydrocarbons.....	0.01	2
Hydrogen.....	0	4
Lead compounds.....	(1)	(1)
Nitrogen.....	78	85
Oxides of nitrogen.....	0	0.4
Oxygen.....	0	4
Sulfur dioxide.....	(2)	(2)
Water vapor.....	5	15

¹ Depends on lead additives.

² Depends on sulfur content of fuel.

Source: References 6 and 7.

Table 2. Carbon monoxide and hydrocarbons in Los Angeles, Calif., near traffic arteries for days with low-level thermal inversion conditions,¹ September 1956²

Street intersection	Carbon monoxide (ppm)		Hydrocarbons (ppm)		Number of samples	Days of sampling
	Maximum	Mean	Maximum	Mean		
Slauson at Figueroa.....	93.2	30.2	2.33	1.32	54	3
La Brea at Olympic.....	65.2	34.4	1.74	1.10	18	1
San Fernando at Highland.....	41.7	15.4	1.56	.76	36	2
Hollywood and Harbor Freeways.....	64.1	36.0	1.83	1.24	36	2
Vine and Ventura.....	48.5	30.8	1.50	.94	36	2

¹ Low-level thermal inversion conditions refer to that condition in the atmosphere when the upper level of air over the earth, instead of being colder than the surface air, is warmer, thereby trapping the air beneath it.

² Average of 6 samples taken every 30 minutes between 6:00 and 8:30 a.m., Pacific Daylight Saving Time, at 3 distances from the curb.

SOURCE: Reference 8.

tion, slight impairment of the oxygen transport function of the blood may have serious consequences. In addition to these people, two other groups are at unusual risk from communitywide exposure to auto exhaust. They are the workmen who experience a similar type of exposure while employed, and persons who inhale tobacco smoke. If a member of these multiple exposure groups is also ill, or has impaired health, then the hazard may be compounded.

Finally, we cannot assume that termination of exposure terminates risk of ill effects. In this connection, data on lung cancer reported in Eastcott's study of emigrants from Great Britain to New Zealand are revealing (14). He found that the duration of exposure to urban air pollution in Britain before emigration was significantly associated with rates of development of lung cancer observed many years later. Since cigarette consumption was similar in Great Britain and New Zealand, the evidence points toward atmospheric pollution as a factor in the causation of the disease.

It will take years to estimate accurately the possible delayed consequences of exposure of large numbers of persons to automobile exhaust fumes, but the possibility of harm exists and is difficult to evaluate by conventional toxicological methods.

Carbon Monoxide

The maximum carbon monoxide concentration reported in table 2 is 93.2 ppm, while the

average values were 15 to 36 ppm. Average concentrations of 4 to 20 ppm, with a maximum of 80 ppm, have been reported in British cities during smog (15). Similarly, an average of 28.9 ppm carbon monoxide in Detroit during heavy traffic has been reported, with a maximum of 80 ppm (16).

More is known about the mechanism of absorption and action of carbon monoxide than about any other noxious substances found in exhaust. This tasteless, odorless, colorless gas is 250 times as firmly bound to hemoglobin as is oxygen. It may be calculated that at equilibrium for every part per million of carbon monoxide reaching the lung, 0.16 percent of the body's hemoglobin is combined with carbon monoxide, and hence inactive. Roughton (17) has shown further that in the presence of carbon monoxide-hemoglobin compounds, oxygen is bound more firmly to hemoglobin, thus further impairing oxygen transport.

While no health damage has been attributed to carbon monoxide exposures below 100 ppm, the presumption that such levels inactivate a small amount of hemoglobin is inescapable. Gaensler and his associates (18) have shown that urban nonsmokers have a CO level corresponding to saturation of 0.62 to 1.24 percent of hemoglobin, while smokers have 3.1 to 7.8 percent. The public health importance of this lies in the certainty that smoking and exposure to automobile exhaust are so common that a very large number of persons are affected in such a way that up to 8 percent of their hemo-

globin is unavailable for oxygen transfer. Accurate predictions of carbon monoxide-hemoglobin levels from environmental measurements are complicated by the fact that some time is taken to reach equilibrium and this time varies with the activity of the subject.

In studies on the adaptation of eyes to darkness McFarland (19) demonstrated an impaired adaptability in older persons which was duplicated in young subjects when breathing gases deficient in oxygen or when exposed to low levels of carbon monoxide. The importance to automobile drivers of visual sensitivity at night is obvious. However, it has not been shown that exposure to automobile exhaust at the levels found on the freeways of a modern city impairs the adaptability of eyes to darkness or alters the exchange of vital respiratory gases, although this is a plausible inference.

Some idea of the possible exposures of drivers is obtained by sampling air in the driver's compartment of motor vehicles, as shown in table 3 (20).

Another way of stating the effect of carbon monoxide is that its inactivation of hemoglobin is similar to withdrawing the corresponding amount of blood from circulation. From this viewpoint a concentration of carbon monoxide of 100 ppm, when equilibrated, is associated with inactivation of about one-sixth of the body's circulating hemoglobin, equivalent in volume to about one pint of blood, with corresponding loss for other concentrations of carbon monoxide.

Nitrogen Oxides

During acceleration and cruising, automobiles emit appreciable quantities of nitric oxide. On mixing with oxygen, nitric oxide is oxidized to nitrogen dioxide, so that a mixture of these two oxides is found in the atmosphere. The concentration of nitrogen oxides in the open air may be 1 ppm at times when CO is 50 ppm.

The toxicity of nitrogen dioxide is based on its irritant properties, often delayed in onset. In cases of significant exposure, signs and symptoms of pulmonary edema have been noted hours to days later (21). Nitric oxide also forms a stable compound with hemoglobin in vitro, which, if it occurred in vivo, would make

the hemoglobin unavailable for transport of carbon dioxide and oxygen.

Nitrogen dioxide on dissolving forms some nitrite ion which is capable of reacting with hemoglobin to yield methemoglobin, also unsuitable for transporting respiratory gases. That this may occur under some circumstances is suggested by a report of methemoglobin levels of 2.3 to 2.6 percent in welders exposed to a mixture of gases including nitrogen oxides (22).

It is unlikely that toxic effects would occur solely from the levels of nitrogen oxides found in places with air pollution due to automobile exhaust. But the similar effect of the reaction of hemoglobin with carbon monoxide and with nitrogen oxides lends greater significance to studying the latter.

Lead Compounds

Nearly all gasoline used in automobiles contains lead tetraethyl, up to as much as 3 ml. per gallon. This lead is mostly discharged through the exhaust to the atmosphere, and this fact has caused much concern over the past 25 years as to the possible effects of lead on health. Lead occurs mostly in the particulate form, and a maximum concentration of 16 micrograms per cubic meter has been reported by Cholak and others in Los Angeles with average values of 7 micrograms per cubic meter (23) during a 4-month period, August–November 1954.

In general, analyses of urban air show lead concentrations which are low in relation to the amount of lead burned in gasoline. This may

Table 3. Levels of carbon monoxide in parts per million found in compartments of drivers of motor vehicles in California

Parts per million	Number of vehicles	Percent of vehicles
0-49-----	1, 014	91.8
50-99-----	69	6.2
100-149-----	13	1.2
150-199-----	5	.4
200-249-----	1	.1
250-299-----	2	.2
600-649-----	1	.1
Total-----	1, 105	100.0

be explained by the fact that the particle size of the exhausted lead ranges from 0.01 micron to several millimeters in diameter, and the large particles can be expected to settle rapidly when exhausted into open air. Moreover, high-speed driving tends to increase the number of heavy particles, and also tends to clean out the exhaust system of lead previously deposited during the light duty, stop-and-go driving conditions (24).

Estimating the retention of lead in the body is complicated by the problem of particle size and composition. Generally speaking the smaller (submicron) particles impinge on the deeper portions of the lung, where they may be rapidly absorbed, while larger particles are more likely to impinge on the mucous layer of the upper portion of the airway and subsequently be swallowed. Such a route is associated with loss of most of the lead in the feces.

One feature of the toxicology of lead indicates that its effect might be related to that of carbon monoxide and of nitric oxides. In chronic lead poisoning, there is found a low-grade anemia and also increased fragility of red blood cells; this may tend indirectly to impair transportation of respiratory gases.

When considered apart, lead exposure from observed levels in Los Angeles and other cities is not toxic, but lead exposures are so common in industry and in garages that the small and persistent increment in exposure associated with auto exhaust may be sufficient to render an otherwise tolerable lead burden a toxic one in a few persons.

Hydrocarbons

Although "hydrocarbons" have been classed as a group in table 2, it is apparent that the group includes many compounds such as paraffins, olefins, aromatics, cycloparaffins, and others. The particular mixture in automobile exhaust depends in part on the fuel used and in part on the way the motor vehicles are operated. The total hydrocarbon concentration in the open air seldom exceeds 2 ppm, hence the concentration of individual compounds will be much less than that. At these low concentrations, only those having known physiological activity are of concern.

One group of hydrocarbons of particular interest includes such compounds as 3,4-benzpyrene which under experimental conditions may produce cancer in animals. This compound, along with others of similar chemical constitution, has been qualitatively identified in automobile exhaust in trace amounts (25,26). Although polynuclear hydrocarbons produce tumors when painted on the skin of susceptible animals, their inhalation has resulted in no experimental lung cancers. Experimental tumors can be produced if the lung's mucosa is damaged, for example, by a transfixion suture soaked in the carcinogen or by a hooked capsule containing the substance which is retained in the bronchus of an experimental animal (27). From such studies one is led to the hypothesis that carcinogenesis occurs on the basis of damage to the mechanisms protecting the underlying tissues.

The possibility that these trace quantities do in fact have a relation to the occurrence of lung cancer is a debatable point, and one on which additional research is necessary. Moreover, even if 3,4-benzpyrene is a cause of lung cancer, it is present to a much greater extent in coal smoke than in automobile exhaust. Communities in which coal is used as a major fuel could expect to find far more 3,4-benzpyrene arising from coal burning than from combustion of petroleum fuels. For example, Los Angeles (28), where no coal is burned, has been found to have 3.3 micrograms of 3,4-benzpyrene per 100 cubic meters of air, while in London (29) values up to 47 micrograms per 100 cubic meters have been reported.

Interactions of Exhaust Components

On the west coast, where weather conditions may lead to poor dispersal of automobile exhaust, and where there is an abundance of solar radiation, an interaction of nitrogen oxides and hydrocarbons occurs. This results in the obnoxious mixture which we call photochemical smog. The principal products are ozone and organic intermediates, some of which irritate eyes and damage plants. Ozone sometimes reaches a concentration of 0.5 ppm or more.

It is known that ozone is a highly irritating

globin is unavailable for oxygen transfer. Accurate predictions of carbon monoxide-hemoglobin levels from environmental measurements are complicated by the fact that some time is taken to reach equilibrium and this time varies with the activity of the subject.

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Total.....	1, 105	100 0

stances is very difficult because of the sensitivity of frail or ill individuals, the indeterminate period of exposure, the effect of agents in combination, and the cumulative effect of exposure from other sources, such as cigarette smoking.

The hazard of automobile exhaust to the population of a large community will depend, among other things, on the extent and way that vehicles are used, and the meteorology of the area.

In the absence of effective control for air pollution from automobile exhaust, the public health hazard should be evaluated.

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substance, and is capable of producing clinical signs of pulmonary irritation. Repeated daily exposures of animals to 1.0 ppm for about a year produced fibrosis of the lung in some species. Recently the hygienic standard for industrial exposure was reduced from 1.0 ppm to 0.1 ppm by the American Conference of Governmental Industrial Hygienists.

Of all the substances mentioned, ozone is the only one in Los Angeles which exceeds the hygienic standard for industrial exposure of 0.1 ppm. However, studies to determine whether respiratory disease or deaths in Los Angeles are more common on days with high air pollution levels have not so far demonstrated such an effect. In a review of the hazards of ozone, Stokinger (30) states that "if the response of the human lung to ozone may be assumed to be similar to that of the animals tested in these studies, one might reasonably conclude that no acute effects on human beings would be expected from ozone exposures occurring in Los Angeles-type smog, owing to the often repeated exposures to very low grade ozone concentrations of the order of a few tenths part per million." Nevertheless, the use of pulmonary function tests on large numbers of persons may assist in reaching a conclusion about the effect of ozone or other irritants on respiratory function.

In addition to ozone, reactive organic intermediates, including free radicals, are formed (31). Whatever the compounds may be that cause eye irritation, it has been proved that these compounds are produced by irradiation of automobile exhaust.

It remains to be shown, however, whether the same compounds irritate the respiratory tract or whether irritation by inhaled substances plus inhaled carcinogens could produce cancer of the lung. More data are needed on the exact nature of the reactions, the concentration of the products, and their physiological effects.

Discussion

Two important effects of the known constituents of automobile exhaust are (a) the conversion of hemoglobin into a relatively stable, inactive form which impairs the efficiency of the blood and circulation in transporting the respiratory gases, oxygen and carbon dioxide, and

(b) the production of respiratory tract irritation or pulmonary edema, either of which interferes with the transport of gases between the blood and the external atmosphere. The severity of both of these effects on individuals would depend on concentrations, length of exposure, age and vigor of the subjects, and other conditions. Concentrations found in the Los Angeles atmosphere have not been shown to interfere with gas transport mechanisms.

We have described what seems to be a potential hazard. To demonstrate whether an actual hazard exists, it will be necessary to combine measurements of exhaust constituents in the atmosphere with estimates of the impairment they produce. For example, measurements should be made of the proportion of hemoglobin inactivated by carbon monoxide and nitric oxides in large numbers of persons exposed to air polluted by automobile exhaust.

We suggest that hygienic standards for automobile exhaust in a community should be set at levels which will produce no health effects on the most susceptible group of persons in the community, defined in terms of age or health status. Among the groups to be considered would be those ill with impaired cerebral or myocardial circulation or impaired pulmonary function.

It is of interest that the public health problems of automobile exhaust have been recently surveyed in the U.S.S.R. with essentially the same conclusions as were independently reached by us (32).

Despite the difficulties, all possible means should be taken to control atmospheric pollution from automobile exhaust. At present it seems unlikely that control devices for automobile exhaust will eliminate all of the potentially harmful substances. Until there is complete control, potential hazards should be recognized and efforts made to assess damage.

Summary

Of the substances which occur in automobile exhaust and their reaction products, hygienic standards have been established for industrial exposure to carbon monoxide, nitrogen dioxide, lead, and ozone. Establishing a full set of levels for community exposures to these sub-

A Baseline Survey Of Pennsylvania Sanitarians And Their Backgrounds

HENRY R. O'BRIEN, M.D., M.P.H.

IN the late spring of 1956, an investigation of the background of sanitarians, which began in Maryland and Puerto Rico in 1954 (1), was extended to Pennsylvania. On both occasions, a training program was in progress. It was felt that the development of further plans would be aided by a knowledge of the situation, in particular, the number of sanitarians, their ages, educational background, salary, length of service, and so on.

The same questionnaire was used in 1956 as in 1954. The blanks were circulated by the divisions of sanitation in Philadelphia and Pittsburgh and by our regional sanitarians to State employees and full-time local sanitarians. In these groups the coverage was practically complete; the one or two local sanitarians who may have been overlooked would not invalidate the findings. In private industry, however, only a beginning was made; this is practically a dip sample.

In most places in the United States, certainly in Pennsylvania, three groups are providing environmental health service: the sanitary or public health engineer at the top, a sanitary inspector in the ranks, usually local, and a new person, the sanitarian, who has now appeared between the other two. The third group is growing in numbers, training, and functions; the second is probably shrinking.

The changes are so rapid that it is valuable to have a record of this study as a baseline, not only as a help in planning training but also for later comparison to measure progress. Many new people are being appointed, with much

more training, to work on new programs or on old programs in new ways. Many of these 1956 findings no longer obtain, but it is essential to have them on record or we shall not know in 1961 or 1966 just how far we have progressed.

This paper considers the "sanitarian" and the "sanitary inspector" together, for the borderline is not yet definite. Staff members and their supervisors are included, but not (a) those with engineering degrees or those doing strictly engineering work, (b) veterinarians concerned with diagnosis or treatment of sick animals, (c) employees of other State departments, (d) Federal workers, (e) laboratory technicians, or (f) laborers.

In all, 312 replies to the questionnaire were received and tabulated, including 91 from the State, 51 from Philadelphia, 43 from Pittsburgh, 107 from smaller local departments of health, and 20 from private industry. Next to public health nurses, sanitarians make up the largest group in public health in Pennsylvania.

Some of the findings of the questionnaire are included in the tables and discussion below. The conclusions from these data are limited in scope, for the questions are few and the numbers are small. However, trends are evident.

Population Ratio

First, we may ask the number of sanitarians employed by health departments in relation to 1956 population estimates. In Pittsburgh, 1 sanitarian was at work per 15,700 persons in the population. In Philadelphia, the ratio was 1 to 42,700 and in the rest of Pennsylvania, counting both State and local sanitarians, 1 to 42,000. In Baltimore and Puerto Rico in 1954, on the other hand, the figure was 1 to 10,000 and in upstate Maryland 1 to 20,000. These proportions are enough to make us consider whether in much of Pennsylvania sanitarians are too few, although they do not reflect the number of sanitarians in private employment, the level of sanitation practice, or the effects of climate or dispersion of population.

Age, Education, and Salary

The age and education of Pennsylvania's sanitarians are shown in table 1. The median

Dr. O'Brien is director of professional training in the Pennsylvania State Department of Health, Harrisburg. This paper was read at the Annual Health Conference, University Park, Pa., on August 19, 1958.

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Stebbins New Chairman of PHR Board of Editors

Dr. Ernest Lyman Stebbins, dean of the Johns Hopkins University School of Hygiene and Public Health for the past 13 years, is the newly appointed chairman of the Board of Editors of *Public Health Reports*. He succeeds Dr. Edward G. McGavran, dean of the University of North Carolina School of Public Health, who has served as chairman since 1952.



Dr. Stebbins entered the public health field in 1931 as an epidemiologist with the Virginia State Department of Health after completing internship and residencies at Clara Barton Hospital in Los Angeles and Presbyterian Hospital and the University Clinic in Chicago.

In 1934, he transferred to the New York State Department of Health and was appointed New York City Health Commissioner in 1942. In 1945, he received the Lincoln Award for distinguished service to the city. From 1940 to 1946 he was a professor of epidemiology at Columbia University.

He served as a medical director with the Public Health Service during the war and retains status as a reserve officer.

Dr. Stebbins is a fellow of the American Medical Association and the American Public Health Association; 1958-59 president of the Advisory Board of Medical Specialties; chairman, American Board of Preventive Medicine; and former president of the American Epidemiological Society.

Publications by Dr. Stebbins include, in addition to reports of scientific research, "Epidemiology and Social Medicine—Social Medicine: Its Derivations and Objectives," Commonwealth Fund, 1949, and "Introduction to Public Health," written with Dr. Harry S. Mustard.

After being graduated by Dartmouth College in 1926, Dr. Stebbins received his medical degree from the Rush Medical School of the University of Chicago in 1929. His master's degree in public health was earned at Johns Hopkins University School of Hygiene and Public Health in 1931.

figures follow the social trends of past generations, when the education of many boys ended with grade school. Later, high school was the accepted stopping point. In the Maryland study, the findings were much the same, but employment of college graduates for this work began in Maryland a little earlier than in Pennsylvania.

The educational breakdown for the different agencies appears in table 2. Three-fourths of the group had finished high school; Philadelphia and private industry made the best showing. One-third graduated from college, Philadelphia and private industry again leading, with local workers far in the rear.

If we look at sanitarians employed only in the last 4 years, a different picture appears. Educational standards went up. Eleven-twelfths of the group had finished high school, and two-thirds, college. This is an indication of what happens today. These Pennsylvania figures in turn are higher than those in the 1954 study.

The major undergraduate courses taken are shown in table 3. Three-fourths (78 percent) followed courses in the biological sciences. Pittsburgh and private industry had a predilection for agricultural graduates, who were still more popular in Maryland.

The current in sanitation today runs strongly

Table 3. Major undergraduate fields for sanitarians with degrees in Pennsylvania, 1956

College major	Total	State	Philadel- phia	Pitts- burgh	Local	Private industry
Biology-----	34	16	13	2	0	3
Chemistry-----	10	3	2	3	0	2
Bacteriology-----	9	5	3	1	0	0
Agriculture or dairy science-----	17	2	1	6	2	6
Sanitary science-----	5	1	4	0	0	0
Veterinary medicine-----	8	2	2	0	4	0
Education-----	2	2	0	0	0	0
Mathematics-----	2	0	1	0	1	0
English, philosophy, psychology, history-----	9	2	3	2	2	0
Government, sociology-----	3	0	1	1	1	0
Other subjects-----	3	1	0	1	1	0
Not stated-----	4	1	0	1	0	2
Total-----	104	33	30	17	11	13

Table 4. Relationship of salary and educational level attained by Pennsylvania sanitarians, 1956

Salary group	Second college degree	First col- lege degree	High school graduate	Some high school	8th grade school or less	Total
\$2,499 or less-----	0	0	16	7	6	29
\$2,500-\$2,999-----	0	1	4	0	2	7
\$3,000-\$3,499-----	0	0	3	2	5	10
\$3,500-\$3,999-----	1	34	42	24	11	112
\$4,000-\$4,499-----	6	7	34	12	10	69
\$4,500-\$4,999-----	5	16	11	1	0	33
\$5,000-\$5,499-----	1	7	4	1	0	13
\$5,500-\$5,999-----	0	2	3	0	0	5
\$6,000-\$6,499-----	3	0	2	1	0	6
\$6,500-\$6,999-----	1	1	1	0	0	3
\$7,000-\$7,499-----	1	0	0	0	0	1
\$7,500-\$7,999-----	0	1	0	0	0	1
\$8,000 or more-----	6	5	2	0	0	13
Not stated-----	1	5	3	0	0	10
Total-----	25	79	125	48	34	312

¹ Educational level not stated for 1 person.

NOTE: Boldface numbers represent the salary group near which the median number falls.

figure for the first college degree is in the 30-34 age group. Those with two degrees are naturally a little older. The median figure for those

with no more than a high school background is at still an older age (45-49), and for those with only grade school, older yet (60-64). These

Table 1. Relationship of age and highest education attained by Pennsylvania sanitarians, 1956

Age group	Second college degree	First college degree	High school graduate	Some high school	8th grade school or less	Total
24 and under	0	8	2	0	0	10
25-29	1	26	7	0	0	34
30-34	8	22	11	0	1	42
35-39	2	8	19	2	0	31
40-44	4	5	18	3	3	33
45-49	3	5	15	5	3	31
50-54	3	2	18	10	3	37
55-59	1	2	9	12	4	28
60-64	1	0	10	5	6	22
65-69	1	1	5	6	7	20
70-74	1	0	5	3	3	12
75-79	0	0	3	2	2	7
80-84	0	0	1	0	2	3
Not stated	0	0	2	0	0	3
Total	25	79	125	48	34	312

¹ Educational level not given for 1 person.

NOTE: Boldface numbers represent the age group near which the median number falls.

Table 2. Educational progress of all Pennsylvania sanitarians in areas studied, 1956

Schooling completed	Total	State	Philadelphia	Pittsburgh	Local	Industrial
All sanitarians						
Total number	312	91	51	43	107	20
8th grade:						
Number	304	91	50	42	101	20
Percent of total	97.4	100	98.8	97.7	94.4	100.0
High school:						
Number	229	70	42	32	67	18
Percent of total	73.4	76.9	82.4	74.4	62.6	90.0
College:						
Number	104	33	30	17	11	13
Percent of total	33.3	36.3	58.8	39.5	10.3	65.0
Sanitarians with less than 4 years in present service						
Total number	124	45	30	14	29	6
8th grade:						
Number	124	45	30	14	29	6
Percent of total	100	100	100	100	100	100.0
High school:						
Number	115	44	30	13	22	6
Percent of total	92.7	97.8	100	92.9	75.9	100.0
College:						
Number	81	29	29	12	6	5
Percent of total	65.3	64.4	96.7	85.7	20.7	83.3

¹ Some of these had been to college, but did not graduate.

with a master's or bachelor's degree in public health do not need this basic course, but the rest do. Table 6 shows a substantial need for such a course, particularly in the local and industrial groups.

Everyone needs the information and the stimulation of a short course in his field, yet only 87 of the 312 attended even one short course in 1953, 102 in 1954, and 118 in 1955. Philadelphia made the best showing of any of the agencies. But some workers in each category, as table 6 shows, attended not one short course in these 3 years. That is withering on the vine indeed. Attendance was especially low among the sanitarians in the smaller local health departments.

It is evident that the local sanitarians are a large body of health workers, usually insufficiently trained, with less formal education, and paid lower salaries than their associates in State or private industry jobs. However, these local people are natural aides for overloaded State

sanitarians. A State sanitarian in close touch with all local workers in his area can help and be helped by such association. It is clear that training for local sanitarians is a sound and necessary investment.

The sanitarians of private industry, barely touched in this study, warrant further coverage in the future.

Conclusion

The figures presented here should be studied by all of us for what they suggest, as a basis for planning and cooperation.

A similar study in other States would prove valuable.

REFERENCE

- (1) O'Brien, H. R., and Neill, A. H.: A pilot survey of sanitarians and their background. *Pub. Health Rep.* 70: 1222-1228, December 1955.

Heart-Sound Recording of Chicago School Children

The heart sounds of 40,000 public elementary school children in Chicago are being recorded in a new study launched on April 20, 1959. The study is being sponsored by an interagency committee. Ultrasensitive tape recording equipment, developed under Chicago Heart Association leadership, is being used; the heart sounds are being recorded on the tape for subsequent analysis. The Public Health Service is providing technical assistance and support.

The objective is to test this mass screening method as a rapid and practical means of finding individuals with abnormal heart sounds. The heart-sound recorder is believed to be as effective as the stethoscope.

In the study, which is scheduled to last about 18 months, at least two cardiologists will listen to all heart-sound recordings, and the findings of each specialist will be checked against the other. Parents of children who need further study will be notified, and secondary screening by physician examination will be performed.

Schools selected represent a cross section of the city's varied population groups. Guiding the project with the Service is a committee of representatives from the following Chicago groups and institutions: the Board of Health, the Board of Education, the Medical Society, the Heart Association, and local universities. A physician from the Chicago Heart Association is serving as project coordinator.

in favor of the biology major. In 1954 the authors asked if anyone really knew whether this was well founded. Today we are emphasizing the importance of the social sciences. Will this be reflected in new requirements?

Table 4 shows that, by and large, educational background is reflected in the paycheck. Differences would probably be greater if it were not that those with less education have been longer on the job, and experience and native ability are valued as well as schooling.

Among the different agencies, local posts tend to pay less than State positions, and private industry appears to pay more than government. It is only fair to say that salaries, especially for State positions, have risen markedly since 1956.

Service and Training

In table 5, we note that more than a third of the sanitarians came to their present employers less than 3 years before this study. The proportion was largest in Philadelphia and in the State and was fairly even in the others. Philadelphia had only two who had been there more than 19 years.

The period of "service with present employer" is usually the same as "total service in sanitation." Sanitarians do some moving among jobs, but not a great deal.

A course of field training in basic sanitation of from 9 to 12 weeks is considered a standard in the preparation of sanitarians, much like the academic year of public health nursing. Those

Table 5. Length of service of Pennsylvania sanitarians with present employer, 1956

Years of service	Total	State	Philadelphia	Pittsburgh	Local	Private industry
Total number of sanitarians.....	312	91	51	43	107	20
Less than 3.....	113	44	30	11	23	5
3-4.....	28	6	1	4	13	4
5-9.....	54	14	7	10	19	4
10-14.....	36	6	6	8	15	1
15-19.....	40	15	5	4	15	1
20-24.....	21	2	2	5	11	1
25-34.....	15	2	0	1	9	3
35 or more.....	1	0	0	0	1	0
Not stated.....	4	2	0	0	1	1

Table 6. Pennsylvania sanitarians having had a course in basic sanitation, 1956

Training and year of training	Total	State	Philadelphia	Pittsburgh	Local	Private industry
Total number of sanitarians.....	312	91	51	43	107	20
Basic training						
MPH or BS in public health.....	17	0	14	2	1	0
9-12 week course.....	159	76	28	29	24	2
No basic course.....	136	15	9	12	82	18
Percent with training.....	54.6	83.5	66.7	72.1	23.4	15
Attendance at a short course						
1953.....	87	31	16	17	17	6
1954.....	102	29	34	19	13	7
1955.....	118	39	30	22	14	7
Number with no course.....	105	13	3	8	70	11
Percent with no course.....	33.7	14.3	5.9	18.6	65.4	55

publications

Directory of Local Health Units. *PHS Publication No. 118; Revised 1958; 75 pages; 30 cents.*

Formerly entitled "Directory of Full-Time Local Health Units," this publication lists the name of each health unit, health officer or administrative head, and headquarters location. Included for the first time are all local areas which State health officers considered organized to provide public health services, irrespective of whether the health officer serves full time or part time, and whether medical, nursing, and sanitation public health services are available at all times.

Part-time employment of a health officer or administrative head is indicated. In addition, the absence of medical, nursing, and sanitation personnel is shown.

The National Mental Health Program and the States. *PHS Publication No. 629; 1959; 13 pages; 10 cents.*

For organizations and individuals interested in community mental health activities, this pamphlet describes grant-supported programs of the National Institute of Mental Health, Public Health Service. It sketches their operation and tells how they affect the States. Mental health consultants and State mental health authorities are listed.

The Mentally Retarded Child at Home. *Children's Bureau Publication No. 374; 1959; by Laura L. Dittmann; 99 pages; 35 cents.*

This manual for parents, approaching the problem of retarded children from the standpoint of sequences of growth and development, stresses the ways in which these children are like other children.

Included are suggestions for toilet training, dressing, cleanliness and manners, discipline, speech, play, and group experiences for the young retarded child. The manual also lists toys and equipment for home

play and provides parents of young children with long-range guides to problems which may arise during the retarded child's school days and his adjustments in adolescence.

Aging. A review of research and training grants supported by the National Institutes of Health. *PHS Publication No. 652; 1958; by G. Halsey Hunt and Stanley R. Mohler; 50 pages; 35 cents.*

A summary of the extramural research and training activities in aging conducted by the National Institutes of Health, Public Health Service, this review describes each of the categorical programs of the seven institutes and the general program of the Division of General Medical Sciences.

It also lists laboratories throughout the United States where research in aging is being conducted.

Sewage Treatment Works Contract Awards, 1952-1957. *PHS Publication No. 633; 1958; by William H. Abbott and Lewis C. Hudson, Jr.; 93 pages; 50 cents.*

This publication summarizes data originally presented in annual reports of public sewage treatment plant construction for the years 1952 through 1957 (PHS Publications Nos. 291, 409, 453, 488, 549, and 608). New tabulations show contract awards for the 6 years, by population size groups, by contract size groups, by drainage basins, and by States. Lists of individual projects, by year and by State, appear in an appendix.

Scientific Translations. A guide to sources and services. *PHS Publication No. 514; Revised 1959; 19 pages; 15 cents.*

Foreign and domestic institutions maintaining files of translations and offering translating services are described briefly and their publications are noted.

Periodicals in complete or partial translation are listed with subscription information. Russian journals in cover-to-cover translation are arranged alphabetically by both English and Russian title.

Information about professional organizations for translators and selected references on various aspects of translating are included.

Poultry Ordinance. *PHS Publication No. 444, Supplement No. 1; 1958; 9 pages.*

This supplement contains recommended provisions on antemortem and postmortem inspection of poultry for wholesomeness, for use by interested States and municipalities in conjunction with other provisions of the ordinance published in 1955. The supplement also includes some revised and additional labeling requirements and definitions necessary in relation to the inspection provisions.

When You Adopt a Child. *Children's Bureau Folder No. 13; Revised 1958; 28 pages; single copies 15 cents, \$10 per 100.*

Counseling prospective adoptive parents to give up all idea of finding a child without help, the booklet answers questions they might ask. It also reviews the questions which will be asked by the caseworker. A new section offers advice on citizenship and birth certificate needs of the child adopted from abroad.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

Signs

and

Symptoms

of trends in public health

"Understanding Aphasia," a 50-page booklet written by Martha L. Taylor, New York Institute of Physical Medicine and Rehabilitation, is designed to help families understand loss of speech and to acquaint them with speech rehabilitation.

" "

When the Chehalis Fluoridation League in Chehalis, Wash., offered \$1,000 reward in 1955 to anyone who could prove that fluorides in 1 ppm concentration had caused any ill effect to anyone anywhere, they were sued by Dr. F. B. Exner. His evidence was based on testimony of a man and wife who had severe dental fluorosis and who had lived in areas where the water supply was presumed to be less than 1 ppm in the public water supply.

Testimony revealed that the dental enamel of this couple had developed prior to the first studies of fluoride levels in water supplies, and that the water used by these people when they were children must have been in excess of 2 ppm. Dr. Exner lost his case and his appeal.

" "

Many members of insured medical plans waste benefits because they are inadequately informed and without guidance, reports the Columbia University School of Public Health and Administrative Medicine.

" "

Sterilizing male mosquitoes by irradiation with cobalt-60 has proved an effective means of reducing the population of malaria-carrying insects, report entomologists from the U.S. Department of Agriculture.

A 389-page study of the Windsor (Canada) medical services has been published by Harvard University Press. The book, "Comprehensive Medical Services Under Voluntary Health Insurance," was written by Benjamin J. Darsky, Dr. Nathan Sinai, and Dr. Solomon J. Axelrod, all with the Bureau of Public Health Economics, University of Michigan School of Public Health.

" "

Phreatophytes (thirsty plants and trees) drink 25 million acre-feet of water annually, reported Dr. D. L. Klingman and F. L. Timmons before the December convention of the American Association for the Advancement of Science.

" "

The Community Services Committee, AFL-CIO, has sent several letters to its local community services committees on health matters. One said, apropos of the Murray-Green Award to Dr. Salk, "The best gift we can give Dr. Salk is the full use of his vaccine." It recommended joint union-management, local health department, and county medical society cooperation in a mass inoculation program on a plantwide basis and in other relevant activities.

Local community services committees were urged also to advance fluoridation.

Since professional workers are "underpaid, underpraised, and unheralded," the committee suggested that community chests allocate 1 percent of total funds raised annually for scholarships. Forums on health problems were suggested as well as further development of public health departments.

Deaths caused by measles during 1957 outnumbered deaths caused by poliomyelitis for the first time since 1944. There were 410 deaths from measles and 220 from poliomyelitis.

" "

The Food and Nutrition Board has approved for publication a report entitled, "Evaluation of Protein Nutrition with Emphasis on Amino Acids Proportionalities," which presents a comprehensive background for critical consideration of the addition of specific amino acids to cereal foods for improvement of protein quality.

A report of the board's Food Protection Committee, with reference to the 1958 amendment to the Federal Food, Drug, and Cosmetic Act, entitled "Food Packaging Materials—Their Composition and Uses," is also approved for publication.

" "

Admissions to schools of professional and practical nursing reached a new high in 1958, according to the National League for Nursing, New York. An estimated 46,600 students entered basic professional nursing schools, compared with 44,281 the preceding year. Some 20,000 began training for careers in practical nursing, compared with 16,710 the year before.

" "

A new booklet, "Your Future," is offered without charge by the Office of Mental Education and Information, Department of Mental Hygiene, Albany, N.Y. Its purpose is to stimulate constructive thinking about the later years.

" "

The automobile insurance industry has set up an Institute for Highway Safety with annual appropriations of \$1,000,000.

" "

The Connecticut Heart Association, in cooperation with the pharmaceutical industry, the retail druggists, and the medical profession, has made it possible for anyone who has had rheumatic fever to purchase penicillin at a discount to prevent recurrence. The price is \$15 per year. Ordinarily a yearly supply costs several times that amount.

publications

Directory of Local Health Units. *PHS Publication No. 118; Revised 1958; 75 pages; 30 cents.*

Formerly entitled "Directory of Full-Time Local Health Units," this publication lists the name of each health unit, health officer or administrative head, and headquarters location. Included for the first time are all local areas which State health officers considered organized to provide public health services, irrespective of whether the health officer serves full time or part time, and whether medical, nursing, and sanitation public health services are available at all times.

Part-time employment of a health officer or administrative head is indicated. In addition, the absence of medical, nursing, and sanitation personnel is shown.

The National Mental Health Program and the States. *PHS Publication No. 629; 1959; 13 pages; 10 cents.*

For organizations and individuals interested in community mental health activities, this pamphlet describes grant-supported programs of the National Institute of Mental Health, Public Health Service. It sketches their operation and tells how they affect the States. Mental health consultants and State mental health authorities are listed.

The Mentally Retarded Child at Home. *Children's Bureau Publication No. 371; 1959; by Laura L. Dittmann; 99 pages; 35 cents.*

This manual for parents, approaching the problem of retarded children from the standpoint of sequences of growth and development, stresses the ways in which these children are like other children.

Included are suggestions for toilet training, dressing, cleanliness and manners, discipline, speech, play, and group experiences for the young retarded child. The manual also lists toys and equipment for home

play and provides parents of young children with long-range guides to problems which may arise during the retarded child's school days and his adjustments in adolescence.

Aging. A review of research and training grants supported by the National Institutes of Health. *PHS Publication No. 652; 1958; by G. Halsey Hunt and Stanley R. Mohler; 50 pages; 35 cents.*

A summary of the extramural research and training activities in aging conducted by the National Institutes of Health, Public Health Service, this review describes each of the categorical programs of the seven institutes and the general program of the Division of General Medical Sciences.

It also lists laboratories throughout the United States where research in aging is being conducted.

Sewage Treatment Works Contract Awards, 1952-1957. *PHS Publication No. 633; 1958; by William H. Abbott and Lewis C. Hudson, Jr.; 93 pages; 50 cents.*

This publication summarizes data originally presented in annual reports of public sewage treatment plant construction for the years 1952 through 1957 (PHS Publications Nos. 291, 409, 453, 488, 549, and 608). New tabulations show contract awards for the 6 years, by population size groups, by contract size groups, by drainage basins, and by States. Lists of individual projects, by year and by State, appear in an appendix.

Scientific Translations. A guide to sources and services. *PHS Publication No. 511; Revised 1959; 19 pages; 15 cents.*

Foreign and domestic institutions maintaining files of translations and offering translating services are described briefly and their publications are noted.

Periodicals in complete or partial translation are listed with subscription information. Russian journals in cover-to-cover translation are arranged alphabetically by both English and Russian title.

Information about professional organizations for translators and selected references on various aspects of translating are included.

Poultry Ordinance. *PHS Publication No. 444, Supplement No. 1; 1958; 9 pages.*

This supplement contains recommended provisions on antemortem and postmortem inspection of poultry for wholesomeness, for use by interested States and municipalities in conjunction with other provisions of the ordinance published in 1955. The supplement also includes some revised and additional labeling requirements and definitions necessary in relation to the inspection provisions.

When You Adopt a Child. *Children's Bureau Folder No. 13; Revised 1958; 28 pages; single copies 15 cents, \$10 per 100.*

Counseling prospective adoptive parents to give up all idea of finding a child without help, the booklet answers questions they might ask. It also reviews the questions which will be asked by the caseworker. A new section offers advice on citizenship and birth certificate needs of the child adopted from abroad.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

ECHOES from Public Health Reports

RIBOFLAVIN DEFICIENCY IN MAN (ARIBOFLAVINOSIS)¹

By W. H. SEBRELL, *Surgeon*, and R. E. BUTLER, *Passed Assistant Surgeon, United States Public Health Service*

Many of the early writers on pellagra (1) recognized that certain symptoms of the disease sometimes occurred without the skin lesions, and the term "pellagra sine pellagra" was introduced to designate these symptoms. In 1912 Stannus (2), in describing pellagra in Nyasaland, particularly noted lesions in the angles of the mouth which he called "angular stomatitis." Similar lesions with various other symptoms have been described by numerous other observers. In 1928 Jenner Wright (3) in Sierra Leone described lesions at the mucocutaneous junction associated with nervous system lesions which were cured by cod liver oil and yeast. Lesions which appear to be similar in many respects have been seen by Fitzgerald (4) (1932) in an Assam prison; Moore (5) (1934) in school children in Nigeria; Landor and Pallister (6) (1935) in the prisons of Singapore and Johore, and Aykroyd and Krishnan (7) (1936) in school children in South India.

As early as 1918 Goldberger, Wheeler, and Sydenstricker (8) suggested that two different dietary factors may be involved in pellagra, and in 1925 Goldberger and Tanner (9), in their experiments with casein, noted that the patients developed a dry, glazed vermilion border of the lips, erosions at the angles of the mouth, reddening of the lips, and seborrhea about the nose. They diagnosed these lesions as pellagra sine pellagra. They also saw in some a pasty, caseous accumulation in the nasolabial folds which cleared up when dried yeast was added to the diet.

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Dr. W. H. Sebrell and Dr. R. E. Butler concluded that a diet low in riboflavin caused a condition known as "pellagra sine pellagra," since the condition disappeared with the administration of synthetic riboflavin. Dr. Sebrell and others later (*Public Health Reports* 56: 510-519, Mar. 14, 1941) specified a daily riboflavin requirement of an adult.

A Health Program for Children in Day Care Services

HUGH CHAPLIN, M.D., and HAROLD JACOBZINER, M.D.

THE NEW YORK CITY Department of Health for the past 7 years has arranged to look after the health of children of low-income families at centers established to provide day care for small children. Introduced only at each center's request, a comprehensive program of health examinations, immunization, and health counseling is now offered at 70 of 76 centers in the city.

These centers are supported by the New York City Department of Welfare, which shared in a series of planning sessions with the health department. Health and welfare officials continue to consult periodically in appraising changing needs and achievements in the centers.

Each center cares for from 40 to 75 children aged 3 to 6 years. About half have only one parent. The children may arrive at the center between 8 and 8:30 a.m. and remain until 5:30 to 6 p.m., 5 days a week, 12 months a year.

The time is fortunately long past when the centers provided mere custodial care by untrained staffs. For the past 15 years all day care services in New York City for children under 6 years of age have been subject to the standards of the New York City Sanitary Code, Section 198. These standards deal with fire and building safety, adequate space per child, the number and qualifications of teachers, types of

educational and play materials and equipment, and the program of indoor and outdoor activity, as well as health requirements. The division of day care and foster homes in the New York City Health Department is responsible for seeing that the centers qualify for a license.

The great majority of the centers are located in excellent quarters in new housing projects. The space is arranged especially for the particular needs of a child care center, and furnishings and equipment are carefully planned for small children. All provide classroom space indoors and play yards outdoors. Teachers must be qualified as educators for preschool children. The director of a center often holds a master's degree in education.

The objective is to provide wholesome, constructive, and enjoyable activities for children, under skilled and understanding guidance with a minimum of regimentation. The centers aim to develop independence in the child and to teach him how to live happily with other children and adults. There is enough supervision to preserve the value of necessary control and encourage self-discipline. Visitors to the centers have said that their principal impression is that the children are relaxed and happy.

The sanitary code requires that each child have a physical examination prior to admission and every 6 months thereafter while attending the center. Records of the examinations must be kept in the centers. Vaccination against smallpox and DTP immunization are also necessary before admission, and daily inspection of the children is required to help ex-

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clude contagion and detect other illnesses. Each staff member who comes in contact with the children must have at the time of employment and every 2 years thereafter a physical examination, including a chest X-ray and any other indicated laboratory tests.

The licensing requirements have undoubtedly raised the standard of day care in this city. However, the requirements are minimal rather than ideal, and they are often barely satisfied. For example, in the past physicians often submitted reports of physical examinations with little significant information. This deficiency could have been due to lack of real parental interest in a thorough examination. Or it is possible that the physician did not realize the importance of his findings to the center's staff.

In an effort to raise health conditions to the optimum, officials of the health and welfare departments began to talk about health services for the city's day care centers in 1947. The first comprehensive health program was tried in 1952.

Principles and Components

A basic principle of the health program is that it is to supplement, not replace, the services of the family physician. The program includes health examinations for the children, immunizations whenever due, and conferences with the parents. The preadmission and the 6 months' examinations, as well as special examinations requested at any time by the center's director, all may be done at the center. However, parents are urged to obtain as many services from their family physician as they wish, and the center's health services are then adjusted to the needs of the individual child.

Another principle is that a parent must always be present when a child is examined. If necessary, parents take time off from work for this purpose. Presence of a parent is required so that a pertinent history can be obtained and the recommendations of the physician and nurse imparted directly. Maintenance of the child's health and development of his total personality are not isolated incidents but are significantly dependent on the health of the family and of the community. Therefore, the health services must be family centered and family oriented. It

is unwise and impractical to view the child as separate from his family and from the community of which he is a part.

The Health Team

Health services at each center are provided by the director, a counselor from the welfare department to take family histories, a physician, and a nurse. The physician is usually assigned to a center for two or three 3-hour sessions each month. The nurse is present at each of these sessions for conferences with the parents. At an extra session, she prepares for the next examining period, determining which children are due for an examination or an immunization injection, checking the health records, and investigating the general health status of the children. She also determines how well the parent has carried out the recommendations of the physician.

Practicing physicians are selected for the program and supervised by a pediatric consultant to the department of health. They are chosen not only because they can be counted on to do thorough health examinations but quite as much because of their sympathetic understanding of the child in his relations with family and associates and their knowledge of growth and development in the child. Participating are approximately 40 physicians, the majority women, some serving as many as 4 centers and others only 1. Six are certified by the American Board of Pediatrics. All have had some formal training in pediatrics.

Nursing service is provided either by the department of health or by one of the approved visiting nurse services.

Health Examination

The health examination is conducted in a leisurely manner and with care. All clothing except the underpants is removed. The children are examined sitting, standing, and lying down. They are referred to appropriate agencies promptly for the treatment of any adverse conditions found.

A special set of eye examinations is used to help the physician rule out anatomical eye defects. Children are screened for visual defects by the educational staff who are instructed in techniques by health department consultants.



... wholesome, constructive, and enjoyable activities ...

If the reports of the physician's examination or of the screening test suggest any abnormality, the physician refers the child to an eye specialist for a complete examination.

Routine health problems of the children are of course handled directly by the center physician. But more serious or complicated problems are first discussed at a case-study conference of the whole health team after each member has examined or interviewed the child with the problem in mind.

Health Counseling

If the health examination and immunizations were all that were included, it is possible that other types of services would prove quite as satisfactory. The program includes, however, a feature that makes it particularly valuable and perhaps unique. This is health counseling. The physician listens to the parent, who must be present at the examination, even as he would

in his office. The nurse not only explains to the parent how to follow the physician's recommendations but also has ample opportunity to discuss many other matters on which the parent may need guidance and reassurance. At the director's request, both physician and nurse once or twice a year attend the monthly parents' meetings, at which they discuss general health questions informally.

Counseling is extended to the teachers, both through personal conferences about special children and at teachers' staff meetings. Individual situations, however, are not discussed at staff meetings.

The nurse also meets at least once a year with the teacher of each child. Affording an opportunity for an exchange of information between nurse and teacher, this conference is intended to insure that children with health problems are referred to appropriate services and that referrals are followed up.

Ancillary Activities

In addition to the regular program, the center health team cooperates in the effort of the health department to promote safety and prevent accidents among children. Physicians and directors report on a designated form to the health department all serious accidents occurring to the children under supervision. Also each director, physician, and nurse has been provided with what might be called a "safety library," which consists of five or more reprints describing how accidents occur and what to do to prevent them. The material is intended for use in counseling with parents or teachers.

Still another part of the center health program is the preparation of the school health form, which is completed to be forwarded to the grade school where the child will be enrolled. The physician fills out the form at the final periodic health examination. Providing this information for the public schools saves considerable time and effort on the part of the physicians of the bureau of school health, as the record stays with the child through his school career.

Orientation and Installation

Early in the development of the health program, we recognized the need for careful advance planning and preparation for installation in a particular center. The center staff, as well as others who are to complete the health team, must be thoroughly oriented as to the aims of the program and their individual duties. To accomplish this important task, the following procedures were worked out:

Action is initiated by the lay board of a child care center through a request to the health department for information. A meeting is then held at the center. Present are members of the lay board, the director of the center, the educational consultant from the department of welfare, a supervisor from the nursing organization that is to provide the public health nurse, and the pediatric and nursing consultants from the division of day care and foster homes. The health department consultants describe the program in detail, and thorough discussion is encouraged.

After this meeting, if the lay board wishes to adopt the program, it must request it in writing from the department of health.

On receipt of the request, the health department arranges a second meeting at the center which actually launches the program. In addition to those at the first meeting, the new center physician and nurse, the department of welfare counselor, and the local district health officer of the health department are present. Every detail of the program is discussed so that each member of the health team will have the opportunity to clarify in his mind his own duties and his relation to other team members.

About 6 months after the program is started, the pediatric and nursing consultants together visit an examination session to evaluate it and to discuss any matters not clearly understood by any member of the center's health team. Even though supervision is continuous, a flexible policy is favored and changes in the program to meet local needs are encouraged, so long as they are consistent with the basic philosophy.

A day care center must meet certain physical requirements before it can participate in the health program. There must be adequate space so that the physician can satisfactorily conduct his examination. The room need not be large, but it must be well lighted and heated during the winter and have proper ventilation. There must be running water nearby and an electrical outlet into which a small stove for sterilizing syringes and needles can be plugged. There must be another room nearby for the nurse-parent conferences.

Another requirement is that the director provide an assistant for the examination sessions, preferably a teacher. The nurse will be counseling with parents and cannot assume responsibility for the administrative phase of the examining session.

Less Than Perfection

It would of course be unrealistic to expect that the health program would operate perfectly in every detail. On the contrary, flaws were expected, and they have indeed appeared.

Perhaps our greatest difficulty is to assure satisfactory teamwork. We are attempting to



... nurse-parent conference ...



... thorough health examination ...

obtain efficient administration of a complicated program that depends for its success on the willing and enthusiastic cooperation of four or five different agencies and different professions and disciplines. The center's board members, the director, the teachers, the welfare department counselor, the physician, and the nurse, as well as the educational consultant of the department of welfare who provides overall supervision for the day care centers, all of these contribute to agreement about the purposes and details of the program for the benefit of the child. The director of the center is the key person in the success of the enterprise. Unless the director is keenly interested, we feel the program should not be started in that center.

Cooperation has been achieved consistently, we believe, because of a number of factors. For one, all concerned feel they have shared in its development, and those who have worked with it are thoroughly sold by the experience. Each center has requested it, and the center physician has expressed a definite desire to join the team. Finally, success in many centers has given impetus to others.

Another difficulty is obtaining and keeping qualified physicians and nurses. Physicians need not be pediatric board members, but they must have had experience with children. They must like children and be interested in the whole child, his psychological as well as his physical development, and his family. They must also be interested in the basic type of public health

education represented by the counseling of parents and teachers.

Because of time limitations, providing adequate supervision for the physicians, nurses, and directors has been still another troublesome area. The consulting pediatrician and nurse in the health department plan to visit together an examining session in every center each 6 months.

At least once a year the pediatric and nursing consultants meet with all the center directors, in groups, to try to help them with problems. Twice a year the health department consultants meet with all the physicians in the program for the same purpose. At these latter meetings also some particular phase of the health program is discussed by a specialist, as a means of constantly improving and expanding the program.

Case Histories

To illustrate the value of the health program, two case reports are cited.

L.C., a 5-year-old girl, was generally well but she often needed cathartics because of persistent constipation. She had intermittent enuresis, and there was a unilateral strabismus. Though a reasonably contented child she was high strung and did not always enjoy good relations with the other children in her class. Her mother was so unstable emotionally that she finally was placed in an institution. For this reason a detailed medical history was difficult to obtain.

The child was given glasses for her strabismus

and received some help regarding her constipation and enuresis. The first few health examinations failed to show any other physical abnormalities. Then quite unexpectedly the physician found an elongated mass in the abdomen extending into the pelvis. The child was admitted at once to a hospital where the diagnosis of megacolon was made. A two-stage abdominoperineal rectosigmoid pull-through operation was successfully performed.

The constipation was cured; the enuresis disappeared; and what was particularly noticeable was the change in her disposition. She became happy, made friends easily, and no longer presented the psychological problem she had shown before.

Repeated thorough health examinations discovered a major abnormality which an unsatisfactory history had helped obscure. Prompt referral and skillful surgery quite changed this child's life.

S.B., born January 19, 1951, was admitted to a child care center on June 20, 1955. His mother had not been able to manage him. He had run away from home a number of times. He was restless and destructive. At the child care center, he took no interest in the class activities, destroyed equipment, knocked down houses other children had built, and even molested the children. He never ran away from the center, however, and seemed fond of his teachers. His mother was so disgusted with him that she sent him to the center each morning in an unkempt condition, and efforts to get her to do a better cleanup job were only partly successful. Then the center physician spoke to the child about cleanliness. As a result the child made his mother wash him and give him clean clothes before he would go to the center.

The first few health examinations failed to show any special abnormalities. Vision screening tests proved impossible because the child would not cooperate. However, the physician felt further efforts should be made to test the

child's vision. He was examined at the Kings County Hospital eye clinic where he was found to be suffering from amblyopia.

Glasses were prescribed with the most remarkable results. He obviously saw clearly for the first time. He became interested in class games, used large and small playthings with great interest, participated well with the other children, and was happy and agreeable.

Though he had not given evidence either to his mother or the center staff of poor vision, he obviously saw very little. Being a high strung child, he took his frustrations out on his environment and his associates. A thorough health program discovered his difficulty.

Conclusion

Looking back on our experience, we believe the following factors have been significant. The program is thorough, yet practical. For the most part, the caliber of the center staffs, the consultants both from the department of welfare and from the department of health, and the physicians and nurses has been unusually high. And perhaps most important, every member of the health team has been carefully chosen and repeatedly briefed about the program before it has been started in any center. Provision has been made also to give the physicians preservice and inservice training.

As a result, nearly 5,000 children of low-income families have undoubtedly been given a better quality of health supervision than they would have received otherwise. We believe the parents have gained a better understanding of parent-child relationships and the kind of health care and supervision they should obtain in the future for their children.

We are greatly encouraged by the success of this program in New York City, and we hope that, with whatever modifications are necessary to meet local conditions, it will be given a trial in other cities.

Patterns of Hospital Prepayment Coverage in the United States, 1956

MAURICE E. ODOROFF, M.A., and LESLIE MORGAN ABBE, B.S.

A NATIONAL household survey of the use of general hospitals has afforded an unusual opportunity to obtain firsthand information on the extent of hospital prepayment coverage. The survey covered about 27,000 households, consisting of some 90,000 persons of all ages, drawn from the civilian noninstitutional population of each State then in the Union. It was conducted by the Bureau of the Census in September 1956, in connection with its Current Population Survey, for the Division of Hospital and Medical Facilities of the Public Health Service. It included three-fourths of the families in each of the 330 sample areas comprising the Current Population Survey base (1). Three earlier reports have described the survey procedures and presented provisional findings on various factors associated with the use of general hospitals (2-4).

As a supplement to the main objective of obtaining information on hospital use, three questions were asked in the survey interview about hospital insurance and membership in other plans providing protection against the costs of hospital care. These questions determined whether or not persons had such protection, the principal type of plan held, and the services covered by the plan. This information could be matched with other data collected on personal and family characteristics. To facilitate accuracy on the part of the respondents, each family was sent a letter ex-

plaining the nature and purpose of the survey and asking them to prepare in advance to supply information about hospitalization insurance or other prepayment coverage.

Instructions to the enumerators contained several definitions relating to prepayment coverage. The insurance or prepayment plans to be included were those of a general nature covering all or some part of hospital costs regardless of the reason for entering the hospital. They included the following:

1. Commercial hospital insurance (when not limited to accidents), on either an individual or group basis.
2. Blue Cross or Blue Shield plans, or other nonprofit plans sponsored by medical societies, on either an individual or group basis.
3. Consumer-sponsored plans (not types 1 and 2) which provide prepaid hospital care, including cooperatives and plans sponsored by fraternal organizations.
4. Industrial plans of an employer or union which provide hospital care beyond that legally required for industrial accidents.
5. Other free or reduced-cost hospital plans, such as hospital employee benefits, free hospital care for dependents of Armed Forces members, and the like.

The following policies and plans were excluded since they are for particular purposes or of uncertain availability: (a) policies covering only accidents, "dread diseases," income lost from disability, clinic or office visits, or liability for injury to others, and (b) free hospital care for veterans in Veterans Administration hospitals.

After establishing the existence of prepay-

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ment coverage in a household, the enumerator asked: "What kind of insurance or plan is it—Blue Cross or something else?" In designating the type of prepayment plan, the term "Blue Cross" is used to include the prepayment plans of more than 80 nonprofit corporate organizations for hospital care, together with related plans of a similar nature covering surgical care under the general term "Blue Shield." "Other plans" are all those not identified as Blue Cross or Blue Shield. For persons who had Blue Cross and another prepayment plan, the enumerators identified and reported only the most comprehensive one. Hence, no more than one plan is reported for each person in the study.

The enumerator next asked: "What kinds of services does the plan cover?" Since all persons previously identified as covered by a prepayment plan were understood to be eligible for hospital care, this question was intended to find out for what other services, if any, they were eligible. The categories of services were defined as follows:

Hospital care: The cost of room and board at the hospital, nursing care, and use of the laboratory, operating room, and similar facilities, whether or not the prepayment plan covers the full cost of all these services.

Surgery: All fees (or any part of the fees) charged by surgeons for performing operations.

Table 1. Hospital prepayment coverage status by race and sex, September 1956

Race and sex	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
All persons.....	63.6	49.2	8.4	6.0
Male.....	64.1	49.7	8.4	6.0
Female.....	63.2	48.8	8.4	6.0
White.....	67.0	52.1	8.4	6.4
Male.....	67.4	52.6	8.4	6.3
Female.....	66.6	51.7	8.4	6.5
Nonwhite.....	35.7	25.2	7.8	2.7
Male.....	36.3	25.5	7.8	2.9
Female.....	35.2	24.9	7.8	2.6

Other combinations of services or other single services.

Table 2. Hospital prepayment coverage status by age and sex, September 1956

Age group (years)	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services
All persons				
All ages.....	63.6	49.2	8.4	6.0
Under 14.....	64.1	50.3	7.1	6.5
14-24.....	60.8	47.7	7.8	5.9
25-34.....	70.8	55.9	7.7	7.3
35-44.....	71.5	55.3	9.4	6.7
45-54.....	68.5	52.9	9.7	5.7
55-64.....	62.6	46.9	11.2	4.3
65 and over.....	36.5	25.1	8.5	2.9
Male				
All ages.....	64.1	49.7	8.4	6.0
Under 14.....	64.0	50.1	7.3	6.5
14-24.....	59.0	47.0	7.3	4.6
25-34.....	70.5	55.7	7.8	7.0
35-44.....	71.9	55.2	9.6	7.1
45-54.....	70.0	51.3	9.4	6.3
55-64.....	64.9	49.1	10.8	5.1
65 and over.....	39.2	27.2	8.9	3.2
Female				
All ages.....	63.2	48.8	8.4	6.0
Under 14.....	64.3	50.4	6.9	6.9
14-24.....	62.3	48.4	8.1	5.9
25-34.....	71.1	56.1	7.7	7.3
35-44.....	71.2	55.4	9.2	6.7
45-54.....	67.2	51.6	9.9	5.7
55-64.....	60.5	44.6	11.6	4.3
65 and over.....	34.2	23.4	8.2	2.6

¹ See table 1, footnote 1.

Other services: Includes general care by a doctor in a hospital, all hospital costs beyond a certain amount (major medical expense insurance), and similar services other than hospital care as described above. This category may include combinations of services in a hospital other than hospital care and surgery or other single services.

This report presents national data on the percentage of the civilian population with hospital prepayment coverage, in accordance with the definitions described above. The data on the extent of coverage are shown in the accompanying tables with respect to demographic, so-

cial, and economic characteristics of the people covered. Coverage is classified by race and sex, age and sex, veteran status, urban-rural type of residence, employment status, and income status for families and individuals. Highlights of the findings are discussed below.

Demographic Factors

Race and sex. Very little difference appears in the extent of prepayment protection for men and that for women, either in the total coverage or in the various forms (table 1). The nonwhite population, however, has much less coverage than the white population. Of the white population, 52.1 percent have hospital and surgical prepayment protection, but only 25.2 percent of the nonwhite population are covered. Coverage under all plans stands at 67.0 percent for the white population and at 35.7 percent for the nonwhite.

Age. The proportion of the population with hospital prepayment protection varies considerably with age (table 2). Coverage under all plans for children under 14 years old is reported as 64.1 percent. The rate rises to a maximum of about 71 percent for persons 25 to 44 years of age, then decreases moderately to age 64. For persons 65 and over, prepayment coverage under all plans combined falls to 36.5 percent, coverage for men of this age reaching 39.2 percent and for women dropping to 34.2 percent.

Table 3. Hospital prepayment coverage status for males 14 years and over by veteran status, September 1956

Veteran status	Percent of males 14 years and over with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
All males 14 years and over.....	64.1	49.5	8.9	5.7
Veterans.....	70.6	54.6	8.9	7.1
World War I.....	73.9	57.2	8.9	7.8
Other veterans.....	61.1	49.5	9.0	5.6
Nonveterans.....	60.3	46.5	8.8	5.0

¹ See table 1, footnote 1.

Table 4. Hospital prepayment coverage status by type of residence, September 1956

Type of residence	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
Urban.....	68.2	51.9	9.8	6.5
Within urbanized areas, total ²	69.2	52.5	10.8	6.0
1 million or more.....	69.0	51.3	12.8	4.8
250,000-999,999.....	68.4	51.8	8.6	8.1
Under 250,000.....	70.7	56.2	8.3	6.3
Outside urbanized areas, total.....	65.7	50.6	7.3	7.8
25,000 or more.....	70.3	59.7	5.9	4.7
2,500-24,999.....	64.0	47.4	7.7	8.9
Rural nonfarm.....	64.4	51.1	6.9	6.5
Rural farm.....	40.3	32.7	4.7	2.9

¹ See table 1, footnote 1.

² Urbanized areas comprise a central city of 50,000 population with its urban fringe, defined as contiguous areas of a population density of 500 dwelling units per square mile, plus similar noncontiguous areas within 1½ miles highway distance. (Metropolitan areas include entire counties and are usually considerably larger than their urbanized areas.) U.S. Bureau of the Census: Census of Population: 1950, vol. 1, pp. xxvii and xxxv.

Veteran status. Only minor variation exists with respect to veteran status for total prepayment coverage (table 3). The rate for all veterans is 70.6 percent and for nonveterans, 60.3 percent. The younger veterans of World War II have a slightly higher percentage of coverage.

Social Factors

Type of residence. The rate of coverage for hospital prepayment protection is consistently high for persons in cities of 50,000 inhabitants or more (table 4). These cities and their built-up fringe areas, defined by the Bureau of the Census as "urbanized areas," have a coverage rate of 69.2 percent. The level of prepayment protection is slightly less for people residing in cities with populations between 2,500 and 25,000, where 64.0 percent are covered. Coverage is much less, 40.3 percent, for people who live on farms.

Employment status and industry. Very marked differentials appear in the proportion

ment coverage in a household, the enumerator asked: "What kind of insurance or plan is it—Blue Cross or something else?" In designating the type of prepayment plan, the term "Blue Cross" is used to include the prepayment plans of more than 80 nonprofit corporate organizations for hospital care, together with related plans of a similar nature covering surgical care under the general term "Blue Shield." "Other plans" are all those not identified as Blue Cross or Blue Shield. For persons who had Blue Cross and another prepayment plan, the enumerators identified and reported only the most comprehensive one. Hence, no more than one plan is reported for each person in the study.

The enumerator next asked: "What kinds of services does the plan cover?" Since all persons previously identified as covered by a prepayment plan were understood to be eligible for hospital care, this question was intended to find out for what other services, if any, they were eligible. The categories of services were defined as follows:

Hospital care: The cost of room and board at the hospital, nursing care, and use of the laboratory, operating room, and similar facilities, whether or not the prepayment plan covers the full cost of all these services.

Surgery: All fees (or any part of the fees) charged by surgeons for performing operations.

Table 1. Hospital prepayment coverage status by race and sex, September 1956

Race and sex	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
All persons.....	63.6	49.2	8.4	6.0
Male.....	64.1	49.7	8.4	6.0
Female.....	63.2	48.8	8.4	6.0
White.....	67.0	52.1	8.4	6.4
Male.....	67.4	52.6	8.4	6.3
Female.....	66.6	51.7	8.4	6.5
Nonwhite.....	35.7	25.2	7.8	2.7
Male.....	36.3	25.5	7.8	2.9
Female.....	35.2	24.9	7.8	2.6

¹ Other combinations of services or other single services.

Table 2. Hospital prepayment coverage status by age and sex, September 1956

Age group (years)	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services
<i>All persons</i>				
All ages.....	63.6	49.2	8.4	6.0
Under 14.....	64.1	50.3	7.1	6.0
14-24.....	60.8	47.7	7.8	5.0
25-34.....	70.8	55.9	7.7	7.0
35-44.....	71.5	55.3	9.4	6.4
45-54.....	68.5	52.9	9.7	5.4
55-64.....	62.6	46.9	11.2	4.7
65 and over.....	36.5	25.1	8.5	2.9
<i>Male</i>				
All ages.....	64.1	49.7	8.4	6.0
Under 14.....	64.0	50.1	7.3	6.5
14-24.....	59.0	47.0	7.3	4.6
25-34.....	70.5	55.7	7.8	7.0
35-44.....	71.9	55.2	9.6	7.1
45-54.....	70.0	54.3	9.4	6.3
55-64.....	64.9	49.1	10.8	5.1
65 and over.....	39.2	27.2	8.9	3.2
<i>Female</i>				
All ages.....	63.2	48.8	8.4	6.0
Under 14.....	64.3	50.4	6.9	6.9
14-24.....	62.3	48.4	8.1	5.9
25-34.....	71.1	56.1	7.7	7.3
35-44.....	71.2	55.4	9.2	6.7
45-54.....	67.2	51.6	9.9	5.7
55-64.....	60.5	44.6	11.6	4.3
65 and over.....	34.2	23.4	8.2	2.6

¹ See table 1, footnote 1.

Other services: Includes general care by a doctor in a hospital, all hospital costs beyond a certain amount (major medical expense insurance), and similar services other than hospital care as described above. This category may include combinations of services in a hospital other than hospital care and surgery or other single services.

This report presents national data on the percentage of the civilian population with hospital prepayment coverage, in accordance with the definitions described above. The data on the extent of coverage are shown in the accompanying tables with respect to demographic, so-

Table 6. Hospital prepayment coverage status by family status and income, September 1956

Family status and income ¹	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ²
<i>Members of primary families</i>				
All incomes.....	65.2	50.6	8.5	6.1
Under \$1000.....	18.4	12.7	4.2	1.6
\$1000-\$1999.....	31.6	23.1	5.8	2.7
\$2000-\$2999.....	47.3	36.3	6.8	4.1
\$3000-\$3999.....	65.2	51.1	8.9	5.3
\$4000-\$4999.....	74.8	59.1	8.4	7.3
\$5000-\$7499.....	81.3	63.8	9.6	7.9
\$7500-\$9999.....	83.6	65.3	9.1	9.2
\$10,000 and over.....	80.1	60.4	12.7	7.0
Income not reported.....	62.0	46.5	10.8	4.7
<i>Primary individuals</i>				
All incomes.....	47.5	34.3	8.6	4.5
Under \$1000.....	25.1	16.4	6.7	2.0
\$1000-\$1999.....	40.4	28.2	7.7	4.5
\$2000-\$2999.....	56.2	40.3	10.3	5.5
\$3000-\$3999.....	73.8	58.0	10.3	5.5
\$4000-\$4999.....	77.3	58.9	9.5	8.9
\$5000 and over.....	73.0	56.2	8.6	8.1
Income not reported.....	56.7	36.1	15.5	5.2

¹ Primary family members include persons related by blood, marriage, or adoption (one being the head of the household); primary individuals are heads of households not living with relatives. "Income" for members of primary families includes money income of all members of the family; for primary individuals, it includes personal income only.

² See table 1, footnote 1.

other sources of coverage (table 7). However, the proportion of all coverage carried by Blue Cross-Blue Shield is about 40 percent for persons with family incomes of less than \$1,000, and about 60 percent at incomes of \$10,000 or more.

Comparison With Other Studies

The data obtained from this study in 1956 provide a useful benchmark in the field of prepayment coverage, which is one of the most rapidly changing aspects of medical care today. One other study on a national scale was conducted in 1953 by Anderson and Feldman, for the Health Information Foundation (5). In addition, annual estimates on the number

of people protected for hospital, surgical, and regular medical expense have been compiled since 1940 by the Health Insurance Council, which now comprises eight insurance associations. These estimates afford a panorama not elsewhere available as to historical trends in the health insurance field (6).

A fairly close correlation appears between

Table 7. Hospital prepayment coverage status by source of principal coverage, by family status and income for selected age groups, September 1956

Family status and income ¹	Percent of population with hospital prepayment coverage, by source of principal coverage		
	All sources	Blue Cross-Blue Shield	Other plans
<i>Members of primary families, 14 years and over</i>			
All incomes.....	65.3	32.9	32.4
Under \$1000.....	19.9	7.1	12.8
\$1000-\$1999.....	34.6	13.7	20.9
\$2000-\$2999.....	49.6	20.4	29.2
\$3000-\$3999.....	65.5	30.4	35.1
\$4000-\$4999.....	74.0	37.4	36.6
\$5000-\$7499.....	80.6	41.9	38.7
\$7500-\$9999.....	82.7	46.6	36.1
\$10,000 and over.....	79.4	48.8	30.6
Income not reported.....	62.5	34.9	27.6
<i>Members of primary families, under 14 years</i>			
All incomes.....	64.9	32.0	32.9
Under \$1000.....	14.8	5.7	9.1
\$1000-\$1999.....	24.3	10.8	13.5
\$2000-\$2999.....	42.2	16.2	26.0
\$3000-\$3999.....	64.6	30.9	33.7
\$4000-\$4999.....	76.4	38.2	35.2
\$5000-\$7499.....	82.9	40.9	42.0
\$7500-\$9999.....	86.2	47.6	38.6
\$10,000 and over.....	82.7	49.3	33.4
Income not reported.....	60.3	31.1	29.2
<i>Primary individuals</i>			
All incomes.....	47.5	23.4	24.1
Under \$1000.....	25.1	10.6	14.5
\$1000-\$1999.....	40.4	19.9	20.5
\$2000-\$2999.....	56.2	27.8	28.4
\$3000-\$3999.....	73.8	38.4	35.4
\$4000-\$4999.....	77.3	30.8	36.5
\$5000 and over.....	73.0	35.1	37.9
Income not reported.....	56.7	32.7	24.0

¹ See table 6, footnote 1.

of hospital prepayment protection according to employment status (table 5). Among wage and salary workers in agriculture the coverage rate is 26.5 percent, much less than one-half the rate of 68.1 percent for all persons in the labor force. At the other end of the scale, wage and salary workers in manufacturing have prepayment protection for 84.9 percent of their number. The lowest coverage among employed persons outside agriculture is in domestic service, with 44.6 percent covered. Among disabled persons, who cannot work, the coverage is about 21 percent.

Income and Family Status

Income is more closely associated with the extent of prepayment protection than any other factor investigated. For both primary families and primary individuals, prepayment pro-

tection rises rapidly as income increases (table 6). When family income is less than \$1,000, only 18.4 percent of primary family members have coverage of any kind. This figure may be compared with 65.2 percent for all primary families and a maximum of 83.6 percent for families with incomes between \$7,500 and \$10,000. A slightly lower proportion of families with incomes over \$10,000, 80.1 percent, have prepayment coverage. For all primary individuals (who live alone or else maintain a household with persons not related to them) the level of prepayment coverage is 47.5 percent, or less than three-fourths of the coverage for all members of primary families.

Income is also related to the type of protection plan carried. Prepayment coverage increases steadily with income, both under Blue Cross plans (including Blue Shield) and under

Table 5. Hospital prepayment coverage status of persons aged 14 years and over by employment status and industry, September 1956

Employment status and industry	Percent of population, aged 14 years and over, with hospital prepayment coverage					
	All types of coverage			Hospital and surgical	Hospital only	Other services ¹
	All persons	Male	Female			
Total, 14 years and over.....	63.4	64.1	62.8	48.8	8.9	5.7
In labor force.....	68.1	68.1	68.3	52.7	9.3	6.1
Employed.....	68.9	68.9	69.0	53.3	9.4	6.2
Agriculture.....	32.6	33.8	29.2	25.2	5.0	2.3
Wage and salary workers.....	26.5	27.7	23.2	19.4	4.4	2.7
Self-employed workers.....	36.7	36.6	-----	29.6	4.9	2.2
Unpaid family workers.....	31.5	33.0	30.8	23.5	6.0	2.0
Nonagricultural industries.....	73.5	73.9	72.8	56.9	10.0	6.6
Wage and salary workers.....	75.2	75.9	73.8	58.4	10.0	6.8
Mining ²	81.5	80.8	-----	58.9	4.3	18.3
Construction.....	59.0	58.4	-----	45.0	9.0	4.9
Manufacturing.....	84.9	85.7	82.5	67.4	10.5	7.0
Transportation.....	81.3	81.5	80.5	63.5	10.5	7.3
Trade.....	70.8	69.3	73.1	55.2	9.2	6.4
Services.....	67.7	67.8	67.7	51.3	10.2	6.2
Private households.....	44.6	47.1	44.2	34.0	7.2	3.4
Professional services.....	74.5	71.0	76.4	56.6	11.2	6.7
Other services.....	71.0	68.0	74.8	53.5	10.6	6.9
Public administration.....	75.1	72.6	81.8	56.6	10.7	7.8
Self-employed workers.....	60.4	59.9	62.3	44.4	9.9	6.1
Unpaid family workers.....	60.8	-----	62.5	51.5	5.9	3.3
Unemployed.....	41.8	35.8	50.2	31.2	6.1	4.5
Not in labor force.....	56.7	45.1	59.6	43.4	8.3	5.1
Keeping house.....	60.7	-----	60.6	46.3	8.6	5.7
Going to school.....	63.7	63.4	63.9	49.7	8.2	5.8
Unable to work.....	20.7	23.2	17.2	13.4	6.1	1.2
Other nonworkers.....	38.2	36.1	46.9	28.0	7.1	2.8

¹ See table 1, footnote 1.

² Includes forestry and fisheries.

cent; and other hospital benefits (other combinations of service or other single services), for 6.0 percent.

Table 8. Patterns of hospital prepayment coverage by socioeconomic characteristics, 1953 and 1956

Socioeconomic characteristic	Percent of civilian noninstitutional population covered		
	HIF survey, July 1953 ¹ (Base: 8,846 persons)	PHS survey, September 1956 (Base: 90,000 persons)	Percent increase
<i>Place of residence</i>			
All areas.....	57	63.6	11
Urban.....	64	68.2	7
Rural nonfarm.....	52	64.4	24
Rural farm.....	38	40.3	6
<i>Age</i>			
Under 6.....	56	64.1	
6-17.....	58		
18-24.....	49	60.8	
25-34.....	64	70.8	11
35-44.....	65	71.5	10
45-54.....	63	68.5	9
55-64.....	54	62.6	16
65 and over.....	31	36.5	18
<i>Employment</i> ⁴			
Manufacturing.....	87	84.9	(5)
Mining.....	89	81.5	(5)
Transportation.....	74	81.3	(5)
Professional services.....	72	74.5	(5)
Trade.....	67	70.8	(5)
Construction.....	57	59.0	(5)
Agriculture.....	63	32.6	(5)
<i>Family income</i>			
All incomes.....	57	65.2	14
Under \$1000.....	26	18.4	
\$1000-\$1999.....		31.6	
\$2000-\$2999.....	48	47.3	
\$3000-\$3999.....	64	65.2	
\$4000-\$4999.....		74.8	
\$5000-\$7499.....	71	81.3	14
\$7500-\$9999.....	71	83.6	
\$10,000 and over.....		80.1	

¹ See reference 5.

² Under 14 years.

³ 14-24 years.

⁴ Coverage basis, 1953 study: percent of families; 1956 study: percent of persons 14 years and over.

⁵ Not fully comparable.

⁶ Includes forestry and fisheries

⁷ \$2,000-\$3,500.

⁸ \$3,500-\$4,999.

The most important contrasts in the extent of prepayment protection are associated with variation in income. In primary families with incomes of less than \$1,000 only 18 percent of the members had protection of any kind. The highest coverage rate was 83.6 percent in families with incomes between \$7,500 and \$10,000. Differences in the rate of prepayment coverage were also great with respect to type of employment: wage and salary workers in agriculture had only 26.5 percent coverage, while those in manufacturing had 84.9 percent. Age, too, was related notably to extent of coverage. Persons 65 years or over had a coverage rate of 36.5 percent, while maximum coverage amounted to 71.5 percent at ages 35 to 44 years. People living on farms had a total coverage of only 40.3 percent. Persons with low incomes had a lower proportion of their total coverage under Blue Cross and Blue Shield than did persons of above-average incomes.

These patterns of hospital prepayment coverage in 1956 provide a benchmark in a rapidly changing field. They also underscore those aspects of our social fabric in which health care is uncertain.

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the trend estimates and the data of the 1953 and 1956 surveys, as shown in the accompanying chart. In this chart all data are related to the total civilian population. Adjustments from a population base covering only the non-institutional population were considered advisable for the data of the two surveys in the comparison because of the difficulty in projecting annual change in institutional population for trend purposes. On this basis, the 1953 survey shows a level of prepayment coverage 6.4 percent below the interpolated percentage estimate of the Health Insurance Council. The 1956 survey shows a level 7.8 percent below the interpolated estimate of the Health Insurance Council. The close agreement of these differentials in the 1953 study and in the present report, when a substantially larger sample base was used (about 90,000 persons, as compared with 8,846 persons), suggests the possibility of overstatement in the annual trend series. One recognized difficulty in the Health Insurance Council estimates is an exact adjustment for duplicate coverage. This was noted in the report of the 1953 survey (5). Other possible sources of differences noted therein include some lag in processing lapsed policies and the likelihood of some under-reporting of coverage by survey response, such as the failure to men-

tion disability policies which carry minor payments for hospital charges.

Another survey on a small scale in Ohio, Connecticut, and Vermont in 1953-54 found that 69 percent of the 1,657 persons studied had hospital prepayment coverage, but this level appears to be sectional in nature (7).

Some comparisons can be made between the Health Information Foundation survey of 1953 and the Public Health Service survey of 1956 with respect to coverage according to socioeconomic characteristics. Table 8 sets forth direct results of the two surveys, based on the noninstitutional civilian population.

Between 1953 and 1956 coverage increased 11 percent nationally, but in rural nonfarm areas it increased 24 percent. Rural nonfarm areas include communities below 2,500 in population and the nonurban fringes of large cities, where it may be assumed that rapid growth in population is principally of urban-oriented families.

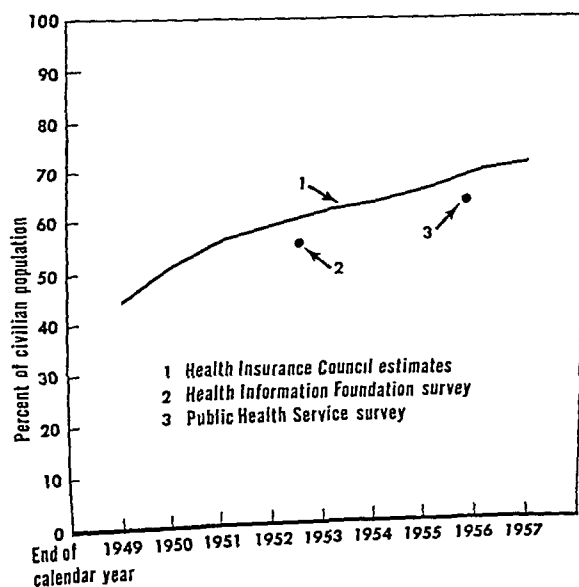
Persons aged 65 years or over with prepayment coverage have increased from 31 percent in 1953 to 36.5 percent in 1956, a proportional gain of 18 percent. A more extensive analysis of the original data of the 1956 survey relating to persons 65 and over has been carried out through special tabulations developed for the Social Security Administration (8).

Levels of prepayment coverage for selected industries in the two studies are shown in table 8 because of their general similarity, although in some cases the reporting bases are different. Distribution of coverage by family income groups also shows fairly close similarity, although income groups were not identical.

Summary

The type and extent of prepayment protection against the costs of hospital care were studied in a national household survey in 1956. A sample of about 27,000 families with 90,000 persons of all ages was interviewed, with sample areas in every State. Hospital prepayment coverage was carried by 63.6 percent of the noninstitutional civilian population. This may be compared with a level of 57 percent found by a Health Information Foundation study in 1953. Hospital and surgical expenses were covered in 1956 for 49.2 percent of the population; hospital expenses only, for 8.4 per-

Hospital prepayment coverage, United States, 1949-57



A study of some 200,000 life insurance policyholders contributes striking evidence that regular cigarette smokers are subject to increased risk of dying from lung cancer, as well as cardiovascular disease, certain respiratory diseases, ulcers, and cirrhosis of the liver.

Tobacco Consumption and Mortality From Cancer and Other Diseases

HAROLD F. DORN, Ph.D.

IN 1954 the Public Health Service in cooperation with the Veterans Administration initiated a study of the causes of death among policyholders of U.S. Government life insurance. This insurance was available only to persons who served in the Armed Forces of the United States between 1917 and 1940. Although most of the policyholders were veterans of World War I, an appreciable number first served after that date. All except less than 0.5 percent of the policyholders included in this study were men.

Method of Study

Beginning in January 1954, a questionnaire requesting information concerning the use of tobacco, usual occupation, and industry was mailed to each policyholder. Usable replies were received from 198,926 persons, or 68 percent of those included in the original mailing. A second questionnaire was mailed to nonrespondents beginning in January 1957. Usable replies were received from an additional 50,000 policyholders, making a total of approximately 249,000, or 85 percent of the number included in the study, for whom information concerning the use of tobacco, occupation,

and residence is available. The nonrespondents have been retained in the study, and the same medical information is available for them as for the respondents.

Whenever a claim is filed for the payment of a policy, the Veterans Administration forwards a copy of the death notice, usually a copy of the official death certificate, to the Public Health Service. Additional medical information, including verification of the causes of death

Dr. Dorn is chief of the Biometrics Branch, Division of Research Services, National Institutes of Health, Public Health Service. This paper is an expanded version of one he presented before the Seventh International Cancer Congress in London, July 8, 1958, which will be published in the Acta, Unio Internationalis Contra Cancrum, during 1959.

The study was carried out in cooperation with the Field Investigations and Demonstrations Branch, National Cancer Institute, Dr. R. F. Kaiser, chief. Dr. W. S. Baum, Division of Indian Health, Public Health Service, assisted in planning and initiating the study.

The Veterans Administration, whose cooperation made the study possible, is nevertheless not responsible for, nor does it necessarily endorse, any of the findings or conclusions of this report.

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Method of Study

Beginning in January 1954, a questionnaire requesting information concerning the use of tobacco, usual occupation, and industry was mailed to each policyholder. Usable replies were received from 198,926 persons, or 68 percent of those included in the original mailing. A second questionnaire was mailed to nonrespondents beginning in January 1957. Usable replies were received from an additional 50,000 policyholders, making a total of approximately 249,000, or 85 percent of the number included in the study, for whom information concerning the use of tobacco, occupation,

and residence is available. The nonrespondents have been retained in the study, and the same medical information is available for them as for the respondents.

Whenever a claim is filed for the payment of a policy, the Veterans Administration forwards a copy of the death notice, usually a copy of the official death certificate, to the Public Health Service. Additional medical information, including verification of the causes of death

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The study was carried out in cooperation with the Field Investigations and Demonstrations Branch, National Cancer Institute, Dr. R. F. Kaiser, chief. Dr. W. S. Baum, Division of Indian Health, Public Health Service, assisted in planning and initiating the study.

The Veterans Administration, whose cooperation made the study possible, is nevertheless not responsible for, nor does it necessarily endorse, any of the findings or conclusions of this report.

SMOKING HISTORY

Persons were classified by smoking history in accordance with the following definitions.

Used tobacco: Persons who had smoked at least 5 to 10 packs of cigarettes or 50 to 75 cigars or 3 to 5 packages of pipe tobacco.

Smoked occasionally only: Persons who had never regularly smoked any form of tobacco but who had occasionally smoked one or more forms. Also included here were persons with unknown amount used either currently or in the past, provided that the maximum amount of known use was occasional only.

Regular smoker: Persons who at sometime during their lifetime had regularly smoked cigars, cigarettes, or pipe tobacco. These were further classified by the form of tobacco used and whether or not they were smoking at the start of the study in 1954.

Regular smoker, cigarettes only: Persons who had regularly smoked only cigarettes. They may have occasionally smoked cigars or a pipe, but they had never smoked either of these regularly.

Regular smoker, cigarette and cigar: Persons who had regularly smoked both cigarettes and cigars. They may have smoked a pipe occasionally but never regularly. Similar definitions were used for regular smokers of other combinations of tobacco.

Amount unknown: Persons who stated they had smoked more than the minimum amount to qualify as a user of tobacco but who did not report the amount used either currently or in the past with sufficient accuracy to permit assignment to one of the groups of regular or occasional smokers.

Amount used: In this report, classification by amount of tobacco used is based on the current amount used at the time the questionnaire was filled

out in 1954. Regular smokers of (a) cigarettes and cigars, (b) cigarettes and pipe, and (c) cigarettes, cigars, and pipe were classified by the current number of cigarettes smoked. Regular users of cigars and pipes were classified by the current number of cigars smoked.

CAUSE OF DEATH

The broad groups of causes of death used in this study (table 4 and fig. 5) include the following categories of the International Statistical Classification of Diseases, Injuries, and Causes of Death (seventh revision, 1955) :

Cancer of lung: 162, 163.

Cancer except lung: 140-205, except 162, 163.

Respiratory diseases:

Respiratory tuberculosis: 001-008.

Asthma: 241.

Influenza and pneumonia: 480-493.

Bronchitis: 500-502.

Emphysema without bronchitis: 527.1.

Other respiratory diseases: 470-475; 527.0; 527.2; 510-526.

Accidents:

Motor vehicle accidents: 810-835.

Other accidents: 800-802; 840-962; 980-991.

Suicide: 970-979.

Cardiovascular diseases:

Cerebral vascular lesions: 330-334.

Rheumatic fever: 400-402.

Chronic rheumatic heart disease: 410-416.

Arteriosclerotic heart disease: 420.

Nonrheumatic chronic endocarditis: 421-422.

Other heart disease: 430-434.

Hypertension with mention of heart disease: 440-443.

Hypertension without mention of heart disease: 444-447.

General arteriosclerosis: 450.

Other circulatory system disease: 451-468.

Chronic nephritis: 592-594.

Other diseases: Remaining categories.

entered on the death certificate, the procedures used to establish these diagnoses, whether the deceased had cancer even though it was not considered to be an underlying or contributory cause of death, and the histological type of cancer, is requested from the physician who signed the death certificate or from the hospital where the death occurred.

Verification of the cause of death is not re-

quested whenever the death occurs outside the United States, is due to an accident, or is certified by a coroner. Replies have been received to more than 99 percent of the letters of inquiry.

The underlying cause of death was changed for 6 percent of the deaths for which a comparison could be made between the entry on the official death certificate and the subsequent in-

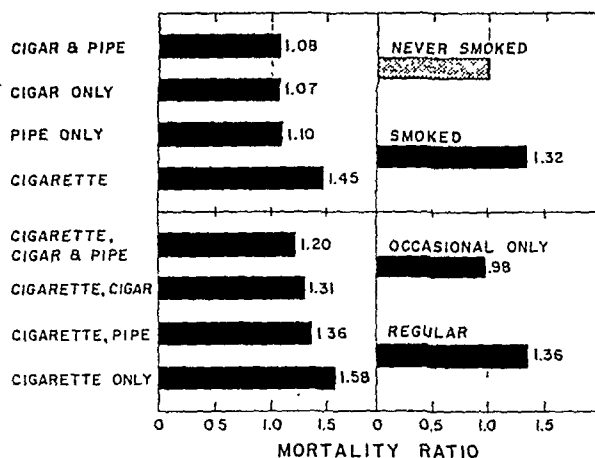
formation received in response to the letters of inquiry. Additional diseases contributory to death were reported for another 12 percent of the deaths, although the underlying cause was unchanged.

An autopsy had been made in nearly one-third (31 percent) of the deaths for which information concerning method of diagnosis was obtained. For about one-half of the deaths (47 percent) the diagnoses were established by exploratory surgery, endoscopy, radiography, or various laboratory tests. The diagnoses of the remaining one-fifth (22 percent) of the deaths were based upon physical examination and clinical history.

Basis of This Report

This report is based on deaths occurring during the 2½-year period July 1954–December 1956 among persons for whom information concerning use of tobacco was obtained prior to July 1954. Deaths during the first 6 months of 1954 have been excluded since the original questionnaire about the use of tobacco was mailed during this period. In addition to persons who died before they received a questionnaire, replies were not received from some persons who were seriously ill when the questionnaire was received; any deaths among these persons were

Figure 1. Mortality of smokers and nonsmokers; ratio of observed to expected number of deaths.



assigned to the group of nonrespondents. Although the death rate of the entire group of policyholders was not changed by this exclusion, the rates for both the nonrespondents and the respondents were biased since a disproportionate number of deaths had to be assigned to the nonrespondent group. Inspection of the data revealed that the effect of this bias had largely disappeared by July 1954.

The following data are based on 478,952 person-years exposure, of which 89,774 were contributed by persons who had never smoked

Table 1. Mortality of smokers and nonsmokers: Ratio of observed to expected number of deaths (all causes), by smoking history and current use, July 1954–December 1956

Smoking history	Number of person-years exposure	Current use		
		Total	Smokes	Does not smoke
Never smoked	89,774	1.00		
Used tobacco	389,178	1.32	1.37	1.24
Occasionally only	28,144	.98	.91	1.05
Regular smoker	339,903	1.36	1.40	1.30
Cigarette total	271,757	1.45	1.54	1.30
Cigarette only	161,172	1.58	1.65	1.39
Cigarette and other	110,585	1.29	1.35	1.21
Cigarette and cigar	21,188	1.31	1.34	1.27
Cigarette and pipe	53,168	1.36	1.41	1.26
Cigarette, cigar, pipe	36,229	1.20	1.28	1.11
Cigar only	28,422	1.07	.94	1.44
Cigar and pipe	21,944	1.08	1.04	1.21
Pipe only	17,780	1.10	1.05	1.25
Amount unknown	21,131	1.06	1.43	1.05

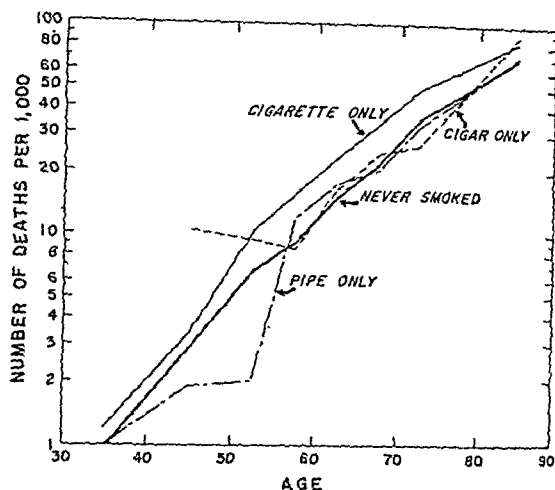
NOTE: Expected number of deaths computed by multiplying the number of person-years exposure in each age group for each smoking history category by the age-specific death rates of persons who had never smoked.

and 389,178 by persons who had smoked tobacco in some form during their lifetime. The number of person-years exposure of persons classified by type of smoking history is shown in table 1.

Unless otherwise specified, the death rate for smokers is expressed as a ratio to that for persons who have never smoked. This mortality ratio is calculated by dividing the number of observed deaths for each smoking history group by the number of expected deaths based on the age-specific death rates of persons who have never smoked. The ratio of 1.32 shown in table 1 for persons who have smoked tobacco at some time means that the death rate for these persons from all causes combined is 32 percent greater than the rate for persons who have never smoked.

The mortality ratio as used here is a measure of the relative excess mortality of smokers compared with nonsmokers. An equally valid measure would be the absolute difference between the observed and the expected number of deaths. The total number of excess deaths, if any, may be apportioned among the various individual causes of death, thus ranking the causes according to the proportion of the total excess number of deaths for which they are responsible. These two measures are designed to emphasize different aspects of the variation in mortality between two groups. The main interest in this paper is the relative difference

Figure 2. Death rate of regular smokers and nonsmokers by age and type of tobacco used.



in the death rate of smokers and nonsmokers; therefore, the mortality ratio will be used exclusively.

Mortality by Type of Smoking

The largest increase in mortality among persons who have smoked is found for those who have regularly smoked only cigarettes (fig. 1). The death rate for these smokers is 58 percent greater than that for nonsmokers. Persons who have smoked regularly only cigars, only a pipe, or cigars and a pipe die at a rate

Table 2. Mortality by age among smokers and nonsmokers: Number of deaths per 1,000 per year, by smoking history and age, July 1954–December 1956

Smoking history	Number of deaths	Death rate per 1,000								
		All ages	30-39	40-49	50-54	55-59	60-64	65-69	70-74	75 and over
Never smoked.....	1, 179	13.1	0.7	2.9	6.6	9.0	14.8	21.6	35.8	70.0
Used tobacco.....	6, 203	15.9	1.3	3.2	9.3	13.1	19.0	28.1	38.6	73.3
Occasionally only.....	345	12.3	2.0	2.7	3.2	9.5	12.9	23.6	30.6	85.2
Regular smoker.....	5, 564	16.4	1.3	3.4	9.8	13.6	19.8	28.9	39.6	72.6
Cigarette total.....	4, 513	16.6	1.4	3.3	10.4	14.4	20.9	31.2	43.5	72.8
Cigarette only.....	2, 771	17.2	1.2	3.4	10.4	15.3	22.9	33.4	49.8	84.7
Cigarette and other.....	1, 742	15.8	1.8	3.1	10.4	13.0	18.1	28.8	37.4	62.9
Cigarette and cigar.....	363	17.1	3.0	7.4	10.2	10.5	17.8	37.0	43.6	48.2
Cigarette and pipe.....	805	15.1	1.4	2.0	10.1	14.1	19.3	28.3	34.9	73.5
Cigarette, cigar, pipe.....	574	15.8	2.2	4.5	11.0	12.8	16.7	24.5	36.3	62.5
Cigar only.....	433	15.2	.0	10.4	9.3	8.5	16.3	24.1	26.7	89.6
Cigar and pipe.....	342	15.6	.0	2.3	7.3	11.1	15.8	23.5	34.6	56.5
Pipe only.....	276	15.5	1.0	1.9	2.0	11.8	17.2	20.6	32.4	71.7
Amount unknown.....	294	13.9	.7	.0	7.8	10.2	15.6	22.9	33.8	67.8

Table 3. Mortality of regular smokers by current amount smoked: Ratio of observed to expected number of deaths (all causes), by smoking history and current amount smoked in 1954, July 1954–December 1956

Smoking history	Ratio of observed to expected deaths					Number of observed deaths				
	Current number of cigarettes smoked per day									
	Occa- sional	Less than 10	10-20	21-39	40 or more	Occa- sional	Less than 10	10-20	21-39	40 or more
Cigarette only-----	0. 96	1. 29	1. 66	1. 77	1. 99	25	205	1, 019	663	137
Cigarette and other-----	1. 08	. 95	1. 37	1. 72	1. 79	72	159	492	319	59
Cigarette and cigar-----	1. 08	. 90	1. 30	1. 75	2. 71	13	35	91	56	19
Cigarette and pipe-----	1. 00	1. 03	1. 36	1. 88	1. 40	27	71	252	180	21
Cigarette, cigar, pipe-----	1. 14	. 88	1. 41	1. 46	1. 73	32	53	149	83	19
Cigar only----- Cigar and pipe-----	Current number of cigars smoked per day									
	Occa- sional	1-2	3-4	5-8	9 or more	Occa- sional	1-2	3-4	5-8	9 or more
	1. 05	0. 71	1. 00	0. 99	1. 44	20	62	97	79	26
	. 93	1. 16	. 99	. 87	1. 33	40	101	67	32	8
	Current number of pipefuls smoked per day									
Pipe only-----	Occa- sional	Less than 5	5-9	10-19	20 or more	Occa- sional	Less than 5	5-9	10-19	20 or more
	0. 86	0. 96	1. 12	0. 98	1. 21	6	44	73	45	29

NOTE: Expected number of deaths computed by multiplying the number of person-years exposure in each age group for each smoking history category by the age-specific death rates of persons who had never smoked.

only slightly in excess of that for nonsmokers. Individuals with a history of regularly smoking cigars or a pipe, or both, in addition to cigarettes are subject to a mortality rate definitely greater than that for nonsmokers but less than the rate for persons who have smoked regularly only cigarettes. Occasional smoking, irrespective of the form of tobacco used, apparently has no effect upon the total death rate.

On January 1, 1954, the policyholders included in this study varied in age from 30 years to more than 80 years. The vast majority, 84 percent, were between 50 and 70 years of age; only 2 percent were more than 70 years old.

The age-specific death rates presented in table 2 and figure 2 show the same relationship between the death rate from all causes and smoking history as the average rates for all ages

combined given in table 1. The relative amount of the excess mortality of regular smokers in comparison with that of nonsmokers decreases after age 70, but this finding cannot be regarded as firmly established because of the small number of persons who were more than 70 years old at the start of the study.

Mortality of Ex-Smokers

Regular cigarette users who had stopped smoking prior to the start of the study in 1954 have a lower death rate than persons who continued to smoke (table 1). Nevertheless their death rate on the average still exceeds that for nonsmokers by 30 percent. The largest absolute decrease in the mortality ratio is found for ex-smokers who have regularly smoked cigarettes only; their mortality ratio is 1.39 com-

pared with 1.65 for persons who were still smoking cigarettes.

The much higher mortality among men who have smoked regularly only cigarettes is emphasized by the fact that the mortality ratio for those who have stopped smoking, 1.39, is slightly greater than the ratio, 1.35, for persons who were continuing to smoke cigarettes in combination with cigars or a pipe. Part of the difference in the death rates for these two groups of cigarette smokers is accounted for by the fact that persons who regularly smoke cigars or a pipe as well as cigarettes smoke fewer cigarettes per day, on the average, than do persons who regularly smoke only cigarettes. After adjusting for differences in age and average number of cigarettes currently smoked, the death rate from all causes combined for cigarette-only smokers is 14 percent greater than

that for persons who smoke cigars or a pipe in addition to cigarettes.

In contrast to cigarette smokers, ex-smokers of cigars and pipes are subject to a higher death rate than persons who continue to smoke these forms of tobacco. The death rate of those who were still regularly smoking cigars or a pipe in early 1954 does not differ significantly from that of persons who had never smoked, whereas the corresponding rate for ex-smokers ranged from 21 to 44 percent higher. This finding suggests that many of these ex-smokers may have stopped smoking because of ill health. Whether or not this ill health may have been related to the use of tobacco is unknown.

Mortality by Current Amount Smoked

Two indexes of the amount of tobacco smoked are available for the persons included in this

Figure 3. Mortality of regular smokers by current amount smoked in 1954 and type of tobacco used; ratio of observed to expected number of deaths.

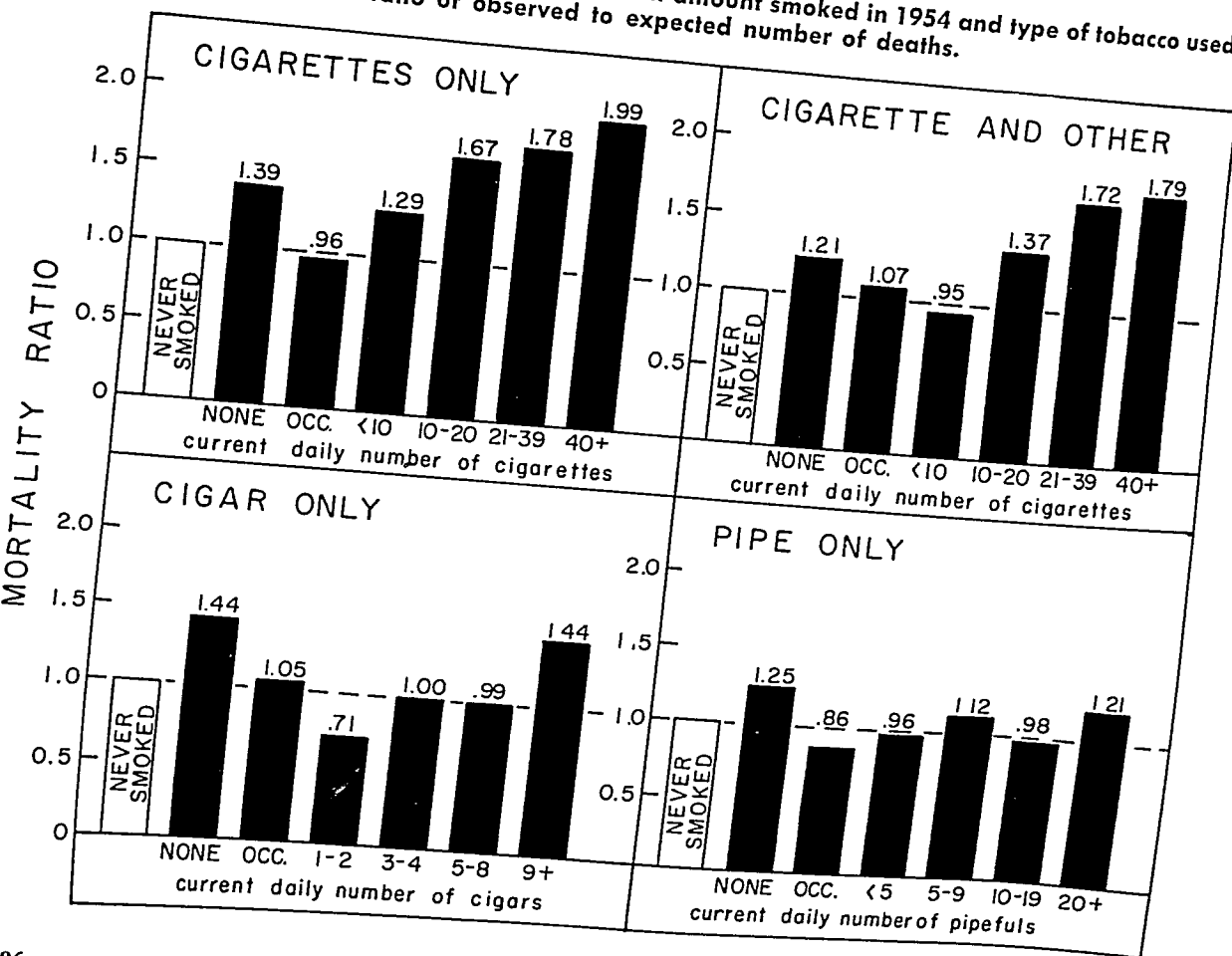


Table 4. Mortality of smokers from broad groups of causes: Ratio of observed to expected number of deaths, by smoking history and causes,¹ July 1954–December 1956.

Smoking history	Ratio of observed to expected deaths ²						Number of observed deaths					
	Cancer of lung	Cancer, except lung	Respiratory diseases	Cardiovascular diseases	Suicide, accidents	Other diseases	Cancer of lung	Cancer, except lung	Respiratory diseases	Cardiovascular diseases	Suicide, accidents	Other diseases
Never smoked or smoked occasionally only-----	1.00	1.00	1.00	1.00	1.00	1.00	17	248	24	1,017	97	121
Used tobacco-----	6.00	1.26	1.66	1.27	.92	1.38	312	981	118	3,983	294	515
Regular smoker-----	6.64	1.30	1.80	1.31	.94	1.41	299	877	112	3,556	261	458
Cigarette total-----	8.32	1.30	2.24	1.40	.91	1.48	283	675	101	2,887	203	363
Cigarette only-----	9.35	1.30	2.76	1.53	.99	1.57	187	385	69	1,780	131	218
Cigarette and other-----	6.40	1.31	1.52	1.24	.79	1.36	96	290	32	1,107	72	145
Cigarette and cigar-----	7.00	1.42	1.00	1.23	.94	1.41	21	64	4	227	16	31
Cigarette and pipe-----	6.29	1.22	2.25	1.32	.75	1.49	44	122	18	518	33	70
Cigarette, cigar, pipe-----	6.20	1.35	1.25	1.14	.79	1.16	31	104	10	362	23	44
Cigar only-----	1.50	1.36	.43	1.00	.92	1.38	6	87	3	271	22	44
Cigar and pipe-----	2.00	1.48	.40	1.00	1.11	1.12	6	74	2	211	20	29
Pipe only-----	1.33	1.03	1.50	1.11	1.07	1.10	4	41	6	187	16	22
Amount unknown-----	2.00	1.00	.75	1.06	.71	1.45	6	45	3	196	12	32

¹ Underlying causes only.

² Expected number of deaths computed by multiplying the number of person-years exposure in each age group for each smoking history category by the age-specific death rates from each cause of death of persons who had never smoked or who had used tobacco only occasionally.

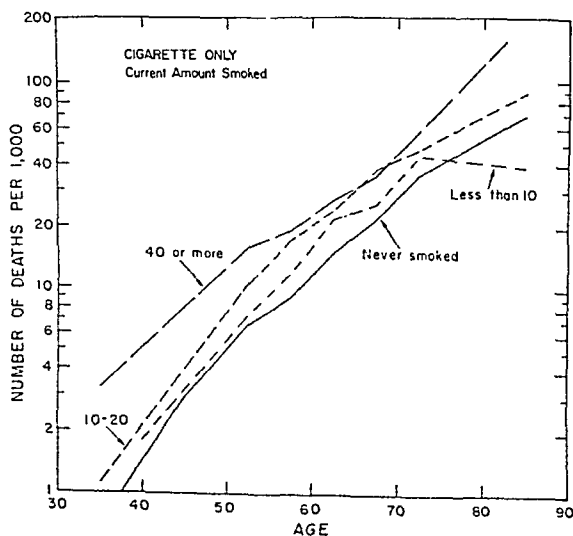
study: (a) the maximum amount ever regularly smoked, and (b) the amount currently smoked in early 1954. Table 3 and figure 3 present mortality ratios for persons currently smoking specified quantities of tobacco in 1954. All of these had smoked regularly at some time, even those smoking only occasionally at the time they completed the questionnaire.

The excess mortality of cigarette smokers is directly related to the average daily number of cigarettes smoked. Those who smoke two packs or more a day have the highest death rate—a rate averaging nearly twice that for nonsmokers. The death rates by age and current amount smoked for regular cigarette users presented in figure 4 show the same direct relationship with the average daily number of cigarettes smoked as do the rates for all ages combined in figure 3.

Only very heavy cigar or pipe smokers experience a higher mortality than nonsmokers. The death rates for the heaviest cigar or pipe smokers, those currently smoking 9 or more cigars or 20 or more pipefuls per day, are about

the same as the rate of persons who smoke from one-half to one pack of cigarettes per day. Among these smokers the mortality ratio is sig-

Figure 4. Death rate of nonsmokers and regular cigarette smokers by age and current amount smoked in 1954.



nificantly greater than one only for persons who regularly smoke cigars only and for the total of the three cigar- and pipe-smoking groups. These data lead to the conclusion that cigar or pipe smoking does not increase the total mortality rate unless large amounts of these forms of tobacco are consumed.

Classification of Deaths

Causes of death were classified according to the rules of the International Statistical Classification of Diseases, Injuries, and Causes of Death published by the World Health Organization. One underlying and a maximum of two contributory causes of death were coded. The selection of the underlying cause of death

was based on the opinion of the deceased's physician except when it was obvious that the physician had misunderstood the intent of the question and had selected a terminal condition such as pulmonary failure or edema as the underlying cause. In addition, a separate code was provided for cases with cancer which the physician stated was not a contributory or underlying cause of death.

The mortality ratios for broad groups of causes (table 4, fig. 5) are based on the underlying cause of death; hence there is only one cause for each death. The mortality ratios for the specific causes of death (figs. 6 and 7, table 5) were computed from both underlying and contributory causes, and for cancer they also in-

Figure 5. Mortality of smokers from broad groups of causes of death; ratio of observed to expected number of deaths; death rate of nonsmokers and persons who have smoked only occasionally equals 1.00.

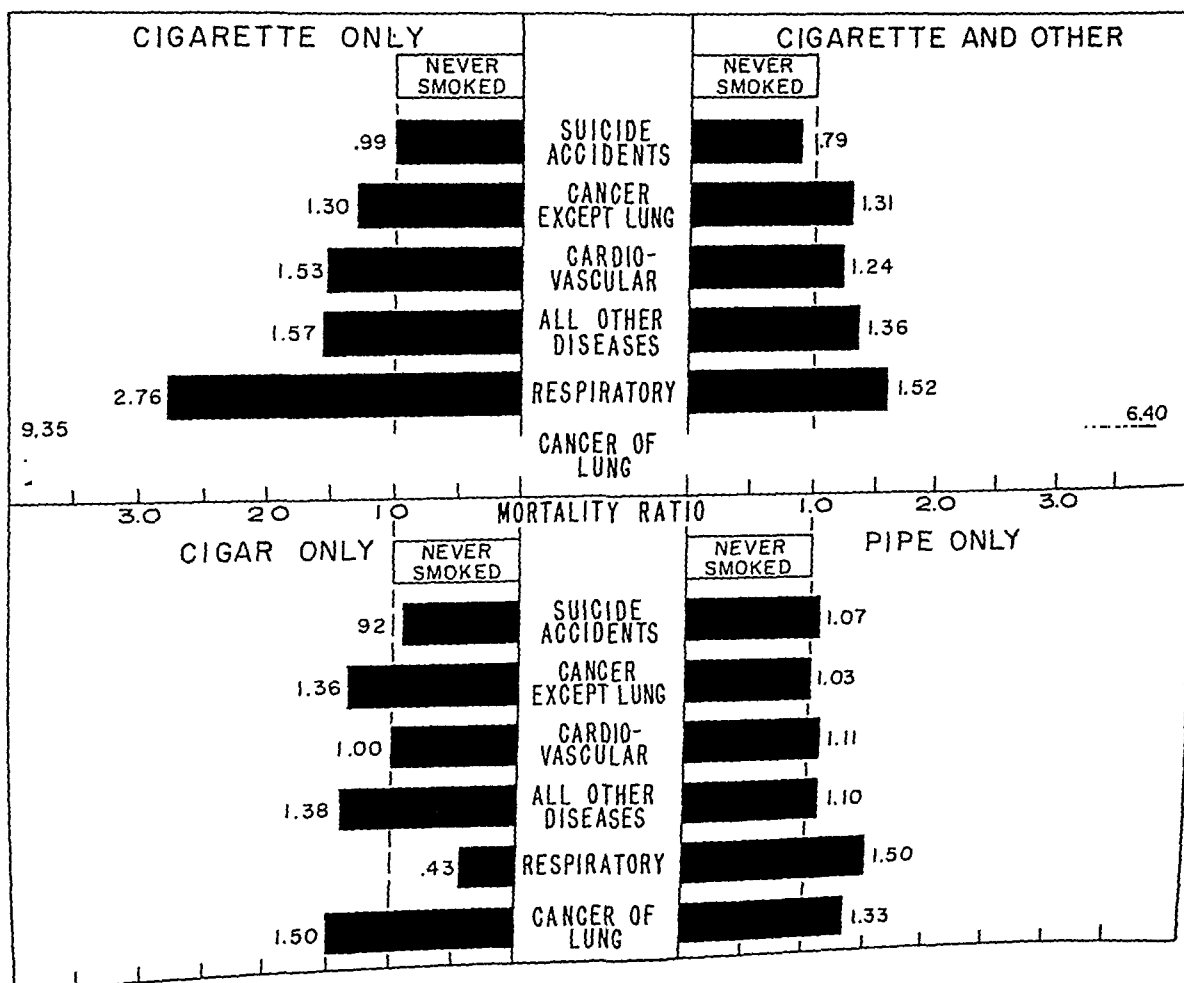
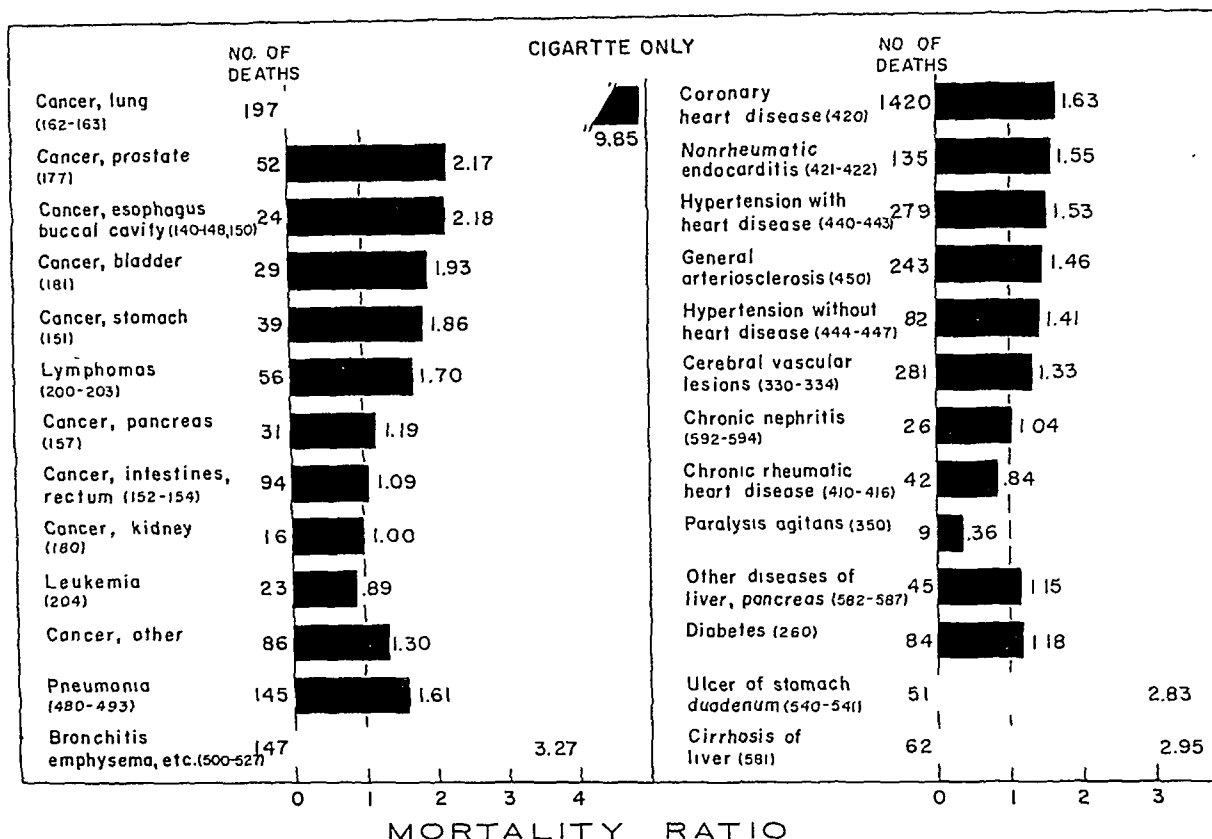


Figure 6. Mortality of regular smokers of cigarettes only from specific diseases; ratio of observed to expected number of deaths; death rate of nonsmokers and persons who have smoked only occasionally equals 1.00.



clude cases with a cancer which the physician stated did not contribute to death. Examples of the latter are skin cancer or clinically quiescent cancer of the prostate discovered during autopsy. One hundred and seventeen of the persons who died had a cancer which was not considered one of the causes of death by the attending physician. Eight of these were cancer of the lung.

The selection of one of several coexisting diseases as the underlying cause of death frequently must be rather arbitrary. In studies of the etiology of disease the important question is whether or not a given disease has developed, not whether this disease has been designated by some method as the underlying cause of death. Hence the data in figure 6 are based on the number of cases of a specified disease. If a policyholder had both diabetes and cancer of the lung, he was counted twice, once in the group with diabetes and once in the

group with cancer of the lung. Consequently, the sum of the numbers of observed deaths is greater than the number of persons who died.

The expected number of deaths on which the mortality ratios by cause are based were computed from the death rates for persons who had never smoked and those who had smoked only occasionally in order to have a statistically more stable basis of comparison. The only cause in table 4 for which the death rates for these two groups differed appreciably is cancer of the lung. There were 10 deaths among persons with lung cancer from the 89,774 person-years exposure of the never-smoked group and 7 deaths from the 28,144 person-years exposure of persons who smoked only occasionally. The corresponding crude death rates were 11 and 25 per 100,000, but this difference is not statistically significant. For simplicity of expression the combined group will be referred to as having never smoked.

Mortality From Broad Cause Groups

By far the greatest increase for smokers in the risk of developing a disease is that for lung cancer. For all persons who had ever smoked the observed number of cases of lung cancer was 312 compared with 52 expected, a mortality ratio of 6.0 (table 4). However, the amount of the increased risk varies widely among the various groups of smokers, ranging from an excess of 33 percent for pipe smokers to 835 percent for cigarette-only smokers. The mortality ratio for none of the three cigar-pipe-smoking groups differs significantly from one; the ratio for the three combined, 1.60, is barely significant at the 5 percent level.

For no other disease does the excess mortality among smokers approach that for lung cancer. The next highest mortality ratio is for a group of respiratory diseases including pulmo-

nary tuberculosis, asthma, bronchitis, emphysema, pneumonia, and pleurisy (fig. 5). Although these diseases are important causes of morbidity, they are numerically unimportant as primary, or underlying, causes of death; only 118 deaths among smokers and 24 deaths among nonsmokers were due directly to one of this group of diseases. The majority of these deaths were attributed to bronchitis, emphysema, pleurisy, empyema, fibrosis of the lung, and similar conditions.

An increased death rate from this group of respiratory diseases is found only among regular cigarette smokers, for whom the mortality ratio is 2.24. As for lung cancer, the highest ratio for respiratory diseases, 2.76, is for persons who smoke cigarettes only. Although the number of deaths among persons who regularly smoke only cigars or a pipe is small, there is

Figure 7. Mortality of regular smokers of cigarettes only, by current amount smoked in 1954 and specific disease; ratio of observed to expected number of deaths; death rate of nonsmokers and persons who have smoked only occasionally equals 1.00.

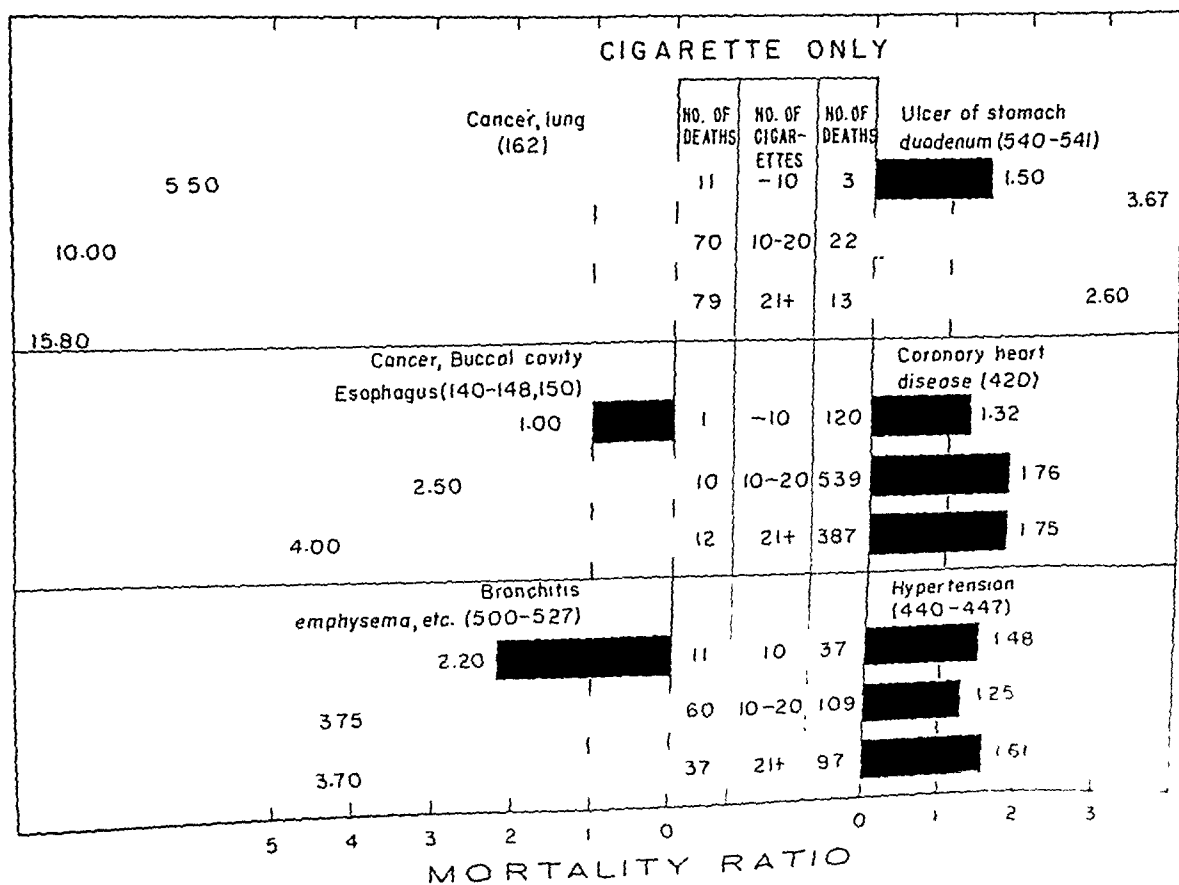


Table 5. Mortality of regular cigarette smokers from specific diseases by amount smoked: Ratio of observed to expected number of deaths of persons who had regularly smoked cigarettes only, by current amount smoked in 1954, July 1954–December 1956¹

Disease	Ratio of observed to expected deaths ²			Number of observed deaths		
	Current amount smoked					
	Less than 10	10-20	21 or more	Less than 10	10-20	21 or more
Cancer of lung (162, 163)-----	5. 50	10. 00	15. 80	11	70	79
Cancer of prostate (177)-----	1. 67	2. 00	2. 33	5	16	14
Cancer of mouth, pharynx, and esophagus (140-148, 150)-----	1. 00	2. 50	4. 00	1	10	12
Cancer of bladder (181)-----	1. 00	1. 83	2. 75	2	11	11
Cancer of stomach (151)-----	4. 50	2. 00	1. 40	9	14	7
Malignant lymphomas (200-203)-----	. 67	1. 91	1. 89	2	21	17
Cancer of pancreas (157)-----	. 67	1. 00	2. 00	2	9	14
Cancer of intestines and rectum (152-154)-----	1. 22	1. 00	1. 14	11	30	25
Cancer of kidney (180)-----	1. 50	1. 17	. 75	3	7	3
Leukemia (204)-----	. 33	. 78	1. 43	1	7	10
Cancer, other forms-----	1. 00	1. 39	1. 39	7	32	25
Pneumonia (480-493)-----	1. 70	1. 78	1. 82	17	57	40
Bronchitis, emphysema, and allied diseases (500-527)-----	2. 20	3. 75	3. 70	11	60	37
Arteriosclerotic (coronary) heart disease (420)-----	1. 32	1. 76	1. 75	120	539	387
Nonrheumatic chronic endocarditis (421-422)-----	1. 30	1. 68	1. 62	13	52	34
Hypertension with heart disease (440-443)-----	1. 32	1. 34	1. 63	25	87	75
General arteriosclerosis (450)-----	. 84	1. 62	1. 46	16	97	57
Hypertension without heart disease (444-447)-----	2. 00	1. 10	1. 57	12	22	22
Cerebral vascular lesions (330-334)-----	1. 54	1. 27	1. 46	37	95	73
Chronic nephritis (592-594)-----	0	1. 00	1. 14	0	9	8
Chronic rheumatic heart disease (410-416)-----	. 80	. 94	. 77	4	16	10
Paralysis agitans (350)-----	. 33	. 11	. 17	1	1	1
Other diseases of liver, gallbladder, and pancreas (582-587)-----	1. 00	. 64	1. 50	4	9	15
Diabetes (260)-----	. 62	. 96	1. 39	5	24	25
Ulcer of stomach and duodenum (540-541)-----	1. 50	3. 67	2. 60	3	22	13
Cirrhosis of liver (581)-----	3. 00	3. 14	4. 17	6	22	25

¹ Underlying and contributory causes of death.

² Expected number of deaths computed by multiplying the number of person-years exposure in each age group by the age-specific death rates from each cause of death (including underlying and contributory causes) of persons who had never smoked or who had used tobacco only occasionally.

no evidence that this group experiences a higher death rate from these respiratory diseases than do nonsmokers.

Nearly two-thirds of the deaths of persons who had used tobacco were attributed to diseases of the cardiovascular-renal system, including chronic nephritis, arteriosclerosis, hypertension, rheumatic heart disease, chronic endocarditis, and coronary occlusion, sclerosis, and thrombosis. The risk of dying from one or more of these diseases is 31 percent greater for regular smokers than for nonsmokers. Again, the risk is greater for regular cigarette users, especially those who have smoked only

cigarettes, than it is for users of other forms of tobacco. There is no indication that regular cigar or pipe smokers experience a higher death rate than nonsmokers.

The mortality ratios for cancer other than cancer of the lung are similar in magnitude to those for cardiovascular diseases except that the ratios for cigar and pipe smokers are as high as those for cigarette smokers. The mortality from these forms of cancer will be discussed in more detail below.

Smokers have no greater risk of committing suicide or of being killed in an accident than do nonsmokers.

Mortality From Specific Causes

As was pointed out above, the death rates for each of the specific diseases include all patients with the disease at the time of death, irrespective of whether or not it was considered the underlying cause. However, a disease was not coded in the absence of evidence that it was clinically active.

Diseases with a mortality ratio greater than 2.0, signifying a death rate more than double that for nonsmokers, are bronchitis, emphysema, and allied respiratory diseases, cirrhosis of the liver, ulcer of the stomach or duodenum, cancer of the prostate, and cancer of the esophagus and buccal cavity (fig. 6). Several studies have reported that heavy smokers also tend to drink alcoholic liquors excessively so that the increased death rate from cirrhosis of the liver may reflect the effect of the consumption of alcohol rather than any effect of cigarette smoking. An increased mortality of cigarette smokers from the other diseases mentioned has been reported in other studies also. An explanation of the high mortality ratio for cancer of the prostate is not apparent.

The death rates from the principal cardiovascular diseases are from 33 percent to 63 percent greater for regular cigarette-only smokers than for nonsmokers. No increase in mortality exists for chronic rheumatic heart disease or for chronic nephritis.

Mortality ratios by current amount smoked for men who were regularly smoking cigarettes only are shown in table 5. The number of observed deaths for several diseases is not large enough to establish that the mortality ratio for heavy smokers is significantly greater or less than the ratio for light smokers. Among these diseases are cancer of the stomach and cancer of the kidney, for which the death rates are lower for heavy than for light smokers, and cancer of the bladder, cancer of the pancreas, and leukemia, for which the death rates are higher for heavy smokers than for light smokers.

But for cancer of the lung and cancer of the buccal cavity and esophagus, the death rate increases rapidly with an increase in the average daily number of cigarettes smoked. The death rate from lung cancer for men who regularly were smoking more than a pack of cigarettes a

day is nearly 16 times the rate for nonsmokers (fig. 7). A similar, although numerically smaller, increase in the mortality ratio with an increase in the number of cigarettes smoked exists also for cancer of the buccal cavity (lip, tongue, mouth, pharynx) and esophagus.

The leading cause of death of the policyholders included in this study is coronary heart disease. Although no difference was found in the death rates for moderate and heavy smokers, those smoking more than 10 cigarettes per day, these rates are greater than that for persons smoking less than 10 cigarettes per day. The difference, however, is considerably less than the corresponding difference for lung cancer. The death rates from hypertension, cerebral vascular lesions, chronic nephritis, and chronic rheumatic heart disease are no higher for heavy than for light smokers.

Summary

1. This report summarizes the mortality experience of nearly 200,000 policyholders of U.S. Government life insurance from July 1954 through December 1956. All these policyholders served in the Armed Forces of the United States between 1917 and 1940.

2. The death rate from all causes for men who have used tobacco is 32 percent greater than that for men who have never smoked.

3. Men who have smoked regularly only cigarettes have the highest death rate of all groups of smokers, 58 percent greater than the rate for nonsmokers.

4. The death rate from all causes for men who have regularly smoked cigars or a pipe, or both, is not appreciably higher than that for nonsmokers.

5. Regular cigarette smokers who had stopped smoking cigarettes before the study began in 1954 have a lower mortality rate than those who continued to smoke. However, the rate for the ex-smokers still is 31 percent greater than that of nonsmokers.

6. The excess mortality of regular cigarette smokers is greater for heavy smokers than for light smokers. Only the heaviest users of cigars and pipe tobacco experience a significant increase in total mortality over that of men who have never smoked.

7. The greatest increase for smokers in the risk of developing a disease is for cancer of the lung. The mortality ratio for regular smokers of cigarettes only is 9.85, or about 10 times that for nonsmokers. The death rate for men smoking more than a pack of cigarettes a day is 16 times that of nonsmokers.

8. Regular users of cigars or a pipe, or both, have an increased mortality rate for cancer of the lung as well as for all forms of cancer as a group, but this increase is much less than that for cigarette smokers.

9. Regular cigarette smokers are subject also to an increased risk of dying from cardiovascular disease, from certain respiratory diseases such as bronchitis, pleurisy, and emphysema,

from ulcers of the stomach and duodenum, and from cirrhosis of the liver.

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Institutes in Care of Premature Infants

Announcement of the 1959–60 schedule of the institutes for physicians and nurses in the care of premature infants at the New York Hospital-Cornell Medical Center marks the 11th year of this service. The institutes are sponsored by the New York State Department of Health and the Children's Bureau.

Designed to meet the needs of physicians and nurses in charge of hospital premature nurseries and special premature centers, and medical and nursing directors and consultants in State and local premature programs, each course is limited in attendance to six physician-nurse teams. The program for physicians is of 2 weeks' duration and for nurses, 4 weeks. Participants pay no tuition and stipends are provided to assist with expenses during attendance.

Early application is essential for the 1959–60 institutes, which will start in 1959 on September 21 and November 2; in 1960, January 4, February 8, and May 9.

Additional information may be obtained by writing Box 143, Institute in the Care of Premature Infants, New York Hospital, 525 East 68th Street, New York 21, N.Y.

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Some Epidemiological Considerations in Rocky Mountain Spotted Fever

CORNELIUS B. PHILIP, Ph.D., Sc.D.

When the following paper was presented in its original form at the 15th International Congress of Zoology, in London, July 1958, the audience included a number of Soviet scientists who were interested in the relation between Rocky Mountain spotted fever and Siberian tick typhus. This relationship has evoked a resurgence of international interest in the spotted fever group of tickborne diseases, reflected here through references to Price and others. Although this paper is limited to observations in the Bitterroot Valley, it was presented with the comment that data still in process at the Rocky Mountain Laboratory appear to confirm ecologic and etiological similarities of Siberian tick typhus with Rocky Mountain spotted fever. A detailed table of hosts, which, as noted below, has been filed with the American Documentation Institute, was prepared specifically with regard to intensive studies by the Russians on rodent hosts of immature tick vectors.

IN the Bitterroot Valley of Montana, where the ecology of Rocky Mountain spotted fever has been longest under study, the common tick vector is *Dermacentor andersoni*, the immature stages of which feed on susceptible small animals. Adult ticks feed on relatively insusceptible large animals and accidentally infect man.

It has long been reported, and is still unexplained, that severe human infections have been acquired only on the west side of the Bitterroot Valley, and that elsewhere, also, levels of virulence vary consistently in different

parts of the range of *D. andersoni*. An average of only 1 to 3 percent of Bitterroot ticks, under varying environmental conditions, have been found to be infected in a 5-year intensive study made by Philip and Parker (unpublished paper). They also observed that the highest infection rate, 13.5 percent, in any one spot is among the precipitous, so-called "goat-rocks" on the west side.

Maintenance in Nature

In 1954 Price (1) reemphasized two factors that have long been considered by Ricketts, Parker, and others of prime importance in the natural persistence of the infectious agent: (a) transovarial passage through successive generations of the tick vectors, and (b) the starting of new lines of infection by the simultaneous feeding of infected and noninfected ticks on susceptible hosts, largely young rodents and rabbits or hares in the Rocky Mountain area of the United States. Since only part of the progeny of an infected female tick "inherit" the agent, Ricketts had logically calculated that the first factor alone would not adequately explain natural maintenance.

Furthermore, the mechanism of the second factor must be more limited than would appear on casual consideration. In the Bitterroot Valley, Columbian ground squirrels are the most numerous and important of the susceptible small animal hosts of immature *D. andersoni* (table 1), but significant differences of tick infestations on these or other rodents between the two sides of the valley are not apparent. Consideration of the difference between the biotic potential of the ticks (5,000 to 8,000 eggs per

Dr. Philip is principal medical entomologist and assistant director of the Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, Public Health Service, Hamilton, Mont.

Signs

and

Symptoms

of trends in public health

The relationship of exercise to coronary heart disease is the subject of a study by J. N. Morris, F.R.C.P., D.P.H., and Margaret D. Crawford, M.D., of London Hospital printed in the *British Medical Journal* (December 20, 1958). The authors suggest that the physical activity of work is a protection and that persons whose jobs involve little or no physical activity are relatively more vulnerable.

« »

Reduction of 17 percent in traffic deaths in Iowa during 1958 is attributed by Safety Commissioner Russell Brown largely to radar speed checks and a point plan for ruling reckless drivers off highways.

« »

Comfortable earplugs that would shut out deafening noises have been recommended by Dr. Aram Glorig, head of the American Academy of the Ophthalmology and Otolaryngology's research center on noise in industry. He says that workers who wear earplugs have normal hearing at the end of a working day. Those who do not wear plugs lose hearing, particularly at 4,000 cycles.

Some workers object to wearing earplugs, fearing that warning cries of danger would go unheard. Glorig says that the opposite is true. Loud noises are shut out by the plugs and speech is made more intelligible.

« »

The College of American Pathologists has supplied 180,000 practicing physicians with a booklet on cyto-diagnosis as an aid to early detection of cancer. The college plans to distribute copies to medical students graduating in the next 5 years.

The Virginia Farmers Union has protested a bill in the South Dakota legislature requiring that its cigarette tax stamps carry skull and crossbones.

« »

A new virus laboratory, in construction in Connecticut, will be equipped for cultural studies, particularly on poliomyelitis, ECHO and Coxsackie infections, smallpox, and herpes, for the Connecticut State Department of Health.

« »

Fires killed at least 11,500 persons and destroyed property valued at a record of \$1,305,000,000 during 1958, estimates the National Fire Protection Association. Loss of lives was 200 more than in 1957.

« »

The first major intensified tuberculin skin-testing program for urban public and parochial senior high school students and personnel is being conducted by the District of Columbia Health Department under grant of \$10,000 from the D.C. Tuberculosis Association.

« »

By 1980, industry will have to find safe ways to segregate 100 million gallons of highly radioactive waste materials having a radioactivity equal to 100 billion curies, Dr. Abel Wolman of the Johns Hopkins University testified in hearings before the Joint Congressional Committee on Atomic Energy. Dr. Wolman also said that rapid development of the atomic energy industry is in no small measure contingent on finding safe and economical methods of waste disposition.

Elderly people's needs of employment, health, nutritional, and housing services are under investigation in Paterson by the division of aging of the New Jersey Department of Health. Interviews are being conducted by 150 volunteers.

« »

Every driver-education car should be equipped with properly installed seat belts, and education in their use should be part of every driving course, according to Dr. A. L. Chapman, chief, Division of Special Health Services, Public Health Service.

« »

Three studies on ways to improve automobile driving were described by Dr. James L. Malfetti, executive officer of Columbia University's Safety Education Institute. The first study is measuring antisocial traits of traffic law violators; another is working on a method for selecting driver-training teachers likely to be most successful; and a third is studying driver behavior in critical situations.

« »

A record low disabling injury frequency rate of 2.98 each million man-hours worked during 1958 has been reported by the chemical industry, a 61 percent improvement over the 7.65 rate reported in 1946.

« »

The United States suicide rate was 9.8 persons for each 100,000 population in 1957, reports the National Office of Vital Statistics.

« »

The United States-Mexico Border Public Health Association reports a 60 percent growth in membership during 1958.

« »

Infants less than 1 year old who are tuberculin-positive, and children between 1 and 4 years of age for whom there is X-ray evidence of active, primary tuberculosis, should be treated with daily doses of isoniazid, the Public Health Service recommends on the basis of a study of 2,750 children.

east of Stevensville, found a tick on her thigh prior to characteristic severe illness from which she recovered. None of the four persons had himself been to the west side within a reasonable time, but circumstances did not eliminate possible indirect west side contacts of the unlikely nature described previously.

The circumstances in the other two cases appeared to remove any reasonable suspicion that west side ticks could have been concerned. One patient was an employee (G. B., 45 years) working on an east side ranch 1 mile east of Victor; the other (J. H., 67 years) was the owner of a ranch known to be tick infested 1½ miles east of Corvallis. Careful questioning found no evidence of visits or movement of stock and wood from the west side within a reasonable period. Neither person had been vaccinated against Rocky Mountain spotted fever. Both had histories of tick bite, with typical rash and fever, and both recovered.

A strain of spotted fever isolated from J. H. was of moderate virulence for guinea pigs through nine successive passages.

Recovery of a symptom-producing strain in guinea pigs from east side *D. andersoni* substantiates that cases can occur in that area. During one series of tests of adult ticks from Harlan Gulch southeast of Hamilton, 1 of 27 guinea pigs, each injected with 2 ticks partially laboratory fed and incubated, developed a fever on the fifth day and died on the ninth. Transfer of tissue from this guinea pig provided a fever-producing strain which was maintained for 27 passages, and its identity with other virulent strains was confirmed.

Nevertheless, the observation remains essentially true and still unexplained that a high proportion of Bitterroot Valley cases have originated from bites of west side ticks, although many people have been bitten by east side ticks.

Rapid Tick Passage

Strains of Rocky Mountain spotted fever have frequently been carried in the laboratory through continuous animal passages for many generations, but this has not previously been done with alternating cycles in ticks. A strain fully virulent for guinea pigs, which had been isolated from a western Montana patient in

May 1946, was selected for this study of the effect on virulence of rapid tick passage. This strain had never been passed in chick embryos but had been through 38 continuous passages in guinea pigs and then stored in the frozen state (dry ice at -70°C.) for 4 years.

In 1955 a series of alternating tick-guinea pig-tick passages was initiated by the simultaneous feeding of infected adult ticks and non-infected nymphs on hosts. Elimination of transovarial passage shortened the intervals needed for tick development in a given passage. In this manner it was possible to compress 13 animal passages due to 12 tick generations, held at room temperatures in humidity jars, into the unexpectedly short period of 25 months. Based on past experience with laboratory strains of differing virulence, the reactions and fatality rates in test animals were used to provide comparisons of virulence in tissue- and tick-infected guinea pigs. These criteria were also used by Price (1).

The uncomplicated histories of 27 guinea pigs infected within the first year after isolation and before freezer storage of the strain are available for comparison with 25 each infected afterward by spleen suspension and citrated blood. The first group of 27 had a mean incubation period of 3.52 days, and 59 percent died. For the second group, the mean incubation periods following spleen and blood injection were 2.76 and 3.32 days, respectively, and 44 and 56 percent died (table 2).

For comparison with these are the clinical records of 24 and 29 guinea pigs bitten by 1 pair each of infected ticks of the 10th and 13th generations. The mean days of incubation were 6.6 and 4.8 respectively, and the fatality rates were 62 and 83 percent. It is probable that most, if not all, of tick-bitten animals were infected by the bites of single females which had been applied 3 days before introduction of males to stimulate rapid and complete engorgement.

The spread in the mean incubation periods between the tissue-transfer and tick-bitten groups is surprisingly low when the more massive inoculums of the former are considered. Fatality after tick bite is actually a little higher. It is remarkable that 16 of 29 animals exposed to the 13th generation of ticks had in-

engorged female) and the observed natural balance (1 pair of adults replacing 1 female in the long run) is such that the tabulated 6.4 average larvae and nymphs per ground squirrel (in which rickettsemia has been shown to last only a few days in any 1 infected animal) will offer only limited support to the idea of new lines of infection. Recovered or immune animals do not contribute to this maintenance mechanism as reported by Price (1) and Philip and Parker (unpublished paper). Although minor yearly fluctuations in numbers of ticks were observed in a quantitative study, no marked increasing or decreasing trends in the local tick population have been observed over several seasons that would alter the above considerations (2).

A third mechanism which could enhance the starting of new lines of infection in areas where susceptible rabbits and hares are more abundant involves widespread infection in the rabbit tick *Haemaphysalis leporis-palustris* (3) and in *Dermacentor parumapertus* (4). All stages of *D. andersoni* also have been found on native hares and rabbits.

A fourth mechanism which has not been adequately explored but which probably assists in natural maintenance of the disease is transmission during copulation of adult ticks on large, mostly insusceptible animals. In 1933 Philip and Parker (5) showed that infected male ticks can pass infection to ova of uninfected females with the sperm. Since male ticks remain on their hosts after engorged females have dropped off, they can and do mate with more than one female over an unknown period, but the percentage of infection in resultant

larvae has not been checked. Until this rate of infection is known, this mechanism cannot be dismissed in the consideration of factors in the maintenance of *Rickettsia rickettsii* in nature.

East Side Human Infections

From the earliest days of settlement, the west side of the Bitterroot Valley has been known as the hazardous side as regards human infection. Most cases, although not all as reported by Price (1), have been in west side residents more or less repeatedly exposed to local ticks or in persons visiting the west side just prior to their illnesses. Very infrequently an east side resident has become ill without obvious west side contacts. Credulity is occasionally strained to reason that the offending tick was brought back from the west side by other members of a patient's household or by a crew of east side laborers who had made a west side visit. Nor is it likely that adult ticks, after once having attached to stock animals brought from the west side, would transfer to persons.

Between 1930 and 1938, there were at least six such "east side" cases. Two of these were in timber workers who contracted Rocky Mountain spotted fever in the lower east side hills in different areas and years. One died; the other, who recovered, had been vaccinated in previous years. A third case was in a 6-year-old girl living on an east side ranch. She had taken a trip to the lower east side hills the week before onset of the disease, which she survived. A tick was found in her scalp. The fourth, a housewife, 33 years, on a ranch 7 miles

Table 1. Average number of immature *Dermacentor andersoni* per small native animal from two sides of Bitterroot Valley, 1930-32

Animal	1930		1931		1932		Average		Average number per animal	Total number animals examined
	West	East	West	East	West	East	West	East		
Columbian ground squirrels.....	4.28	22.1	4.07	5.58	5.0	5.77	4.45	11.15	6.37	954
Golden-mantled ground squirrels.....	14.43	(¹)	9.2	(¹)	13.25	(¹)	12.29	(¹)	13.2	48
Chipmunks.....	3.2	1.38	.93	.89	1.96	3.8	2.03	2.02	2.0	430
Woodchucks.....	6.1	2.81	7.0	7.85	3.66	.55	5.55	3.55	5.2	63
Snowshoe hares.....	0	7.5	8.3	(²)	1.0	(²)	3.1	2.7	2.2	33

¹ No golden-mantled ground squirrels on east side of valley.

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² Hares not available on east side 1931-32.

east of Stevensville, found a tick on her thigh prior to characteristic severe illness from which she recovered. None of the four persons had himself been to the west side within a reasonable time, but circumstances did not eliminate possible indirect west side contacts of the unlikely nature described previously.

The circumstances in the other two cases appeared to remove any reasonable suspicion that west side ticks could have been concerned. One patient was an employee (G. B., 45 years) working on an east side ranch 1 mile east of Victor; the other (J. H., 67 years) was the owner of a ranch known to be tick infested $1\frac{1}{2}$ miles east of Corvallis. Careful questioning found no evidence of visits or movement of stock and wood from the west side within a reasonable period. Neither person had been vaccinated against Rocky Mountain spotted fever. Both had histories of tick bite, with typical rash and fever, and both recovered.

A strain of spotted fever isolated from J. H. was of moderate virulence for guinea pigs through nine successive passages.

Recovery of a symptom-producing strain in guinea pigs from east side *D. andersoni* substantiates that cases can occur in that area. During one series of tests of adult ticks from Harlan Gulch southeast of Hamilton, 1 of 27 guinea pigs, each injected with 2 ticks partially laboratory fed and incubated, developed a fever on the fifth day and died on the ninth. Transfer of tissue from this guinea pig provided a fever-producing strain which was maintained for 27 passages, and its identity with other virulent strains was confirmed.

Nevertheless, the observation remains essentially true and still unexplained that a high proportion of Bitterroot Valley cases have originated from bites of west side ticks, although many people have been bitten by east side ticks.

Rapid Tick Passage

Strains of Rocky Mountain spotted fever have frequently been carried in the laboratory through continuous animal passages for many generations, but this has not previously been done with alternating cycles in ticks. A strain fully virulent for guinea pigs, which had been isolated from a western Montana patient in

May 1946, was selected for this study of the effect on virulence of rapid tick passage. This strain had never been passed in chick embryos but had been through 38 continuous passages in guinea pigs and then stored in the frozen state (dry ice at -70° C.) for 4 years.

In 1955 a series of alternating tick-guinea pig-tick passages was initiated by the simultaneous feeding of infected adult ticks and non-infected nymphs on hosts. Elimination of transovarial passage shortened the intervals needed for tick development in a given passage. In this manner it was possible to compress 13 animal passages due to 12 tick generations, held at room temperatures in humidity jars, into the unexpectedly short period of 25 months. Based on past experience with laboratory strains of differing virulence, the reactions and fatality rates in test animals were used to provide comparisons of virulence in tissue- and tick-infected guinea pigs. These criteria were also used by Price (1).

The uncomplicated histories of 27 guinea pigs infected within the first year after isolation and before freezer storage of the strain are available for comparison with 25 each infected afterward by spleen suspension and citrated blood. The first group of 27 had a mean incubation period of 3.52 days, and 59 percent died. For the second group, the mean incubation periods following spleen and blood injection were 2.76 and 3.32 days, respectively, and 44 and 56 percent died (table 2).

For comparison with these are the clinical records of 24 and 29 guinea pigs bitten by 1 pair each of infected ticks of the 10th and 13th generations. The mean days of incubation were 6.6 and 4.8 respectively, and the fatality rates were 62 and 83 percent. It is probable that most, if not all, of tick-bitten animals were infected by the bites of single females which had been applied 3 days before introduction of males to stimulate rapid and complete engorgement.

The spread in the mean incubation periods between the tissue-transfer and tick-bitten groups is surprisingly low when the more massive inoculums of the former are considered. Fatality after tick bite is actually a little higher. It is remarkable that 16 of 29 animals exposed to the 13th generation of ticks had in-

Table 2. Comparison of animal tissues with tick bites as sources of infection of Rocky Mountain spotted fever in guinea pigs

Test group	Num-ber of guinea pigs	Mean days of incubation	Extremes, days of incubation		Mean days of fever	Num-ber re-cov-ered	Per-cent mor-tality	Mean day of death	Extremes, day of death		Number of guinea pigs showing—	
			Mini-mum	Maxi-mum					Mini-mum	Maxi-mum	Scrotal swelling	Sloughing
Before storage: Blood virus-----	27	3.52	2	5	(¹)	11	59	13.87	9	19	26	25
After storage: Blood virus-----	25	3.32	2	6	7.6	11	56	11.69	9	18	23	11
Spleen suspension-----	25	2.76	2	5	7.6	14	44	10.04	8	14	24	11
Tick feeding:												
10th generation ² -----	24	6.61	4	11	5.5	9	63	16.82	10	32	14	7
13th generation ² -----	29	4.89	2	11	7.1	5	83	13.33	9	24	27	15
Routine feeding ³ -----	19	4.57	3	7	6.0	5	74	11.92	9	16	16	3

¹ Not calculated because too many animals were sacrificed for strain passage.

² Single unfed female ticks of each "generation" attached to each animal for a minimum of 3 days before a male is introduced into each capsule to promote rapid feeding.

³ Multiple tick feeding during 13 passages.

incubation periods as short as 2 to 4 days which could only have followed bites of single, unrefrigerated female ticks.

A comparison of various clinical features following various routes of infection is provided in table 2. No significant change was detectable after 13 generations of rapid tick passage, and the virulence of the strain for guinea pigs appeared to be fully maintained. It also appears that the virulence of the strain after 4 years' storage in the frozen state had not been markedly altered.

Tick Feces as a Source of Infection

Tick feces are considered a source of human infection with *Pasteurella tularensis* in tularemia (6) and with *Coxiella burnetii* in Q fever (7, 8), just as louse feces are a source of epidemic typhus. Experimental evidence indicates that infection with spotted fever among animal handlers is much less likely to occur through a similar agency.

Female *D. andersoni* ticks, during engorgement, customarily show a sequence of defecation of dry pellets for several days, then a rather viscous mass of altered blood, followed terminally by whitish plaques apparently of excretion from malpighian ducts.

Freshly excreted fecal pellets, masses, and plaques were collected at intervals from single,

female ticks while feeding on 12 different guinea pigs; each animal became infected as a result of tick bite and died of spotted fever. Collected feces were macerated on the moistened, intact or abraded skins of 68 test animals in 3 series of tests without producing infection. All animals were proved to be susceptible. Fecal suspensions in physiological saline from only two of the four ticks in one series caused infection when injected intraperitoneally into other guinea pigs at least 5 to 9 days after attachment, prior to which early feces from even these two ticks were noninfectious by injection (table 3).

Attempts To Infect Fleas and Mosquitoes

The tropical rat flea *Xenopsylla cheopis* is the well-known vector of the endemic typhus agent, *Rickettsia typhi*. It was of interest to test adaptability of *R. rickettsii* of spotted fever to this flea or to indigenous rodent fleas in order to investigate the possibility that they might play a secondary role in natural maintenance. Dr. William L. Jellison of the Rocky Mountain Laboratory assisted in some of these earlier studies.

X. cheopis fleas were fed for 6 days during pyrexia in a fatally infected guinea pig. Transmission was not effected by injection of 6 freshly fed fleas, by transfer of 28 fleas to a

capsule on a new animal where they were observed feeding on the 8th and 12th days, or by injection of 1 living and 5 recently dead fleas from this animal after 21 days into another guinea pig.

Similar tests with the common woodchuck flea, *Thrassis acamantis*, gave negative results in 2 series of tests by injections of 1 to 13 fleas after various intervals, by immediate transfer, during interrupted feeding, of 13 fleas between a donor with fever and scrotal lesions and a new animal; and by transfer of other fleas to a new host after several days on the donor. At least three fleas remained active for as long as 9 days on the second host, and a suspension of these was noninfectious when injected into a third.

Tests of transmission by four lots of the rabbit flea, *Cediopsylla inaequalis*, also proved negative. Two lots of fleas were fed on infected domestic rabbits with fever and orchitis for 6 and 10 days, and allowed to transfer from sacrificed donors to fresh rabbits. After 13 days on the new hosts, one flea from each failed to infect additional rabbits by bite, or guinea pigs after injection. Fleas of the other two

lots were permitted in a similar manner to transfer from laboratory-infected, native cottontail donors to domestic rabbits without causing infection. Injections of fleas from both donor and test rabbits into guinea pigs up to 37 days were noninfectious. Tissues of both donor cottontails produced disease when injected into guinea pigs at time of transfer of fleas.

Mosquitoes have been observed feeding on hares in nature (9) and will undoubtedly accept opportunities to attack rodents as well. However, three lots of *Aedes aegypti* failed to become infected when fed on infected donor guinea pigs, according to tests by bites and injection during 14 days' storage at room temperature.

It is apparent that neither fleas nor mosquitoes, at least under conditions of these tests, are likely vectors of Rocky Mountain spotted fever rickettsiae in nature.

Summary and Conclusions

Mechanisms of natural maintenance of spotted fever rickettsiae are reviewed in the light of new information and with relation to the fauna

Table 3. Sample results of tests with tick feces during separate engorgement of two female *Dermacentor andersoni*

Experiment and test guinea pig number	Day of test	Test dose of feces ¹	Route of infection	Outcome of test guinea pigs	
				Original exposure	Challenge RMSf
III, donor a: ²					
1	5	3 pellets	Abraded	No reaction	Susceptible.
2	5		Clipped	No reaction	Susceptible.
3	5		Injected	No reaction	Susceptible.
4	8	10 pellets	Abraded	No reaction	Susceptible.
5	8		Clipped	No reaction	Susceptible.
6	8		Injected	RMSf (died)	Susceptible.
7	9	12 hemolyzed pellets	Abraded	No reaction	Susceptible.
8	9		Clipped	No reaction	Susceptible.
9	9		Injected	RMSf (died)	Susceptible.
III, donor d: ³					
10	3	14 pellets	Abraded	No reaction	Susceptible.
11	3		Clipped	Pneumonia	Invalidated.
12	3		Injected	No reaction	Susceptible.
13	5	20 pellets	Abraded	No reaction	Susceptible.
14	5		Clipped	No reaction	Susceptible.
15	5		Injected	RMSf (died)	Susceptible.
16	6	Hemolyzed mass	Abraded	No reaction	Susceptible.
17	6		Clipped	No reaction	Susceptible.
18	6		Injected	RMSf (recovered)	Immune.

¹ 1 hour's fresh deposit from each tick used in aliquot portions for transfer on each day. ² Donor guinea pig had 6 days of incubation, 2 days of fever, and died on the 10th day. ³ Donor guinea pig had 4 days of incubation, 6 days of fever, died on the 12th day.

of the Bitterroot Valley of Montana. Contrary to some reports, evidence is presented for the possible exceptional contraction of human infection and the occasional occurrence of relatively virulent strains on the east side of the valley. Although data continue to support accumulated observations that virulent spotted fever is mainly prevalent on the west side, an adequate explanation, ecological or otherwise, for this difference is still not apparent.

To check any possible effect on virulence, a strain of Rocky Mountain spotted fever was used to infect guinea pigs in 13 rapid passages through bites of 12 alternate generations of *Dermacentor andersoni* compressed into a period of 25 months. Uninfected, immature ticks were fed simultaneously with infected adults during each fresh guinea passage to establish each new generation. The infection rate in test animals was as effective following paired tick feedings as in using direct blood or spleen transfers. There appeared to be little significant change in virulence after 13 alternating tick passages, as judged by comparison of clinical data. However, the fatality rate was a little higher following tick feeding than after tissue passage.

Feces of ectoparasites are not as potential a source of infection in spotted fever as they are in certain other tickborne diseases, such as Q fever and tularemia, or as in louseborne typhus fever. Neither fleas of three different species nor aedine mosquitoes appeared to be adaptable to an incidental role in natural maintenance of the agent, though important rodent hosts carry over an average period many more fleas than ticks and are probably frequently bitten by indigenous mosquitoes.

It is possible that some of these observations will apply to Siberian tick typhus also. Not only is the ecology of that disease more similar to spotted fever than to tickborne fièvre boutonneuse and related diseases in Europe, Africa, and India, but comparative etiological studies in progress substantiate this difference in relationships.

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DOCUMENTATION NOTE

An additional table covering total numbers of larval and nymphal *Dermacentor andersoni* taken on small native animals through three seasons on two sides of the Bitterroot Valley has been deposited as document No. 5916 with the American Documentation Institute Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A photoprint copy may be obtained by remitting \$1.25; a 35-mm. microfilm copy by remitting \$1.25. Cite document number. Advance payment is required. Make checks or money orders payable to Chief, Photoduplication Service, Library of Congress.

The Public Health Nurse As Coordinator in a Geriatric Clinic

ESTELLE T. MALACHOWSKI, P.H.N.

THE GOAL of the geriatric clinic of the San Francisco Regional Office of the Veterans Administration is to help the patient and prevent the necessity of hospitalization or institutional care as long as possible.

The clinic's patients are veterans of the Spanish-American War. Under Public Law 791, 81st Congress, they are eligible to receive medical supervision and appropriate coordinated services. These men, whose median age is 79 years, challenge the clinic to give them more years to live. Confronting geriatrics in the future are the veterans of World War I, whose median age is 66 years. This group does not have the blanket type of outpatient medical care plan provided for the older veterans.

The clinic, opened in 1952, was the first of its kind in the Veterans Administration. The pilot study report, "Coordinated Approach to Geriatrics," is also the first recorded attempt to demonstrate a team approach to geriatrics in a regional office of the Veterans Administration (1). The clinic provides facilities and therapeutic accommodations in medicine, public health nursing, physical therapy, nutrition, social service, and psychiatry. Its personnel collaborate with staff specialists, consultants of the regional office, and regular visiting consultants from the local medical society, and with community agencies to give the veteran the care he requires.

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The complications of illnesses, disabilities, and personal and social difficulties of the Spanish-American War veteran are often multiple. To help him with these, the geriatric clinic has a team of specialists consisting of the chief of the clinic, public health nurse, social service worker, physical therapist, psychiatric consultant, and medical secretary.

Clinic sessions are held each Tuesday from 9 to 11:30 a.m. The physical setting includes a clinic room used for other clinics at other times, a waiting room which seats 10 patients, the office of the public health nurse, an emergency bedroom, a surgical unit, and a central supply unit.

Prior to his initial visit to the clinic, the patient has been given a complete physical examination by the staff geriatric consultant, and medical and laboratory records are ready for review. At the clinic the new patient is first interviewed by the public health nurse, whose previous hospital experience and education in public health have prepared her to act as counselor to the patient and coordinator of the clinic's services.

She takes the patient's blood pressure, pulse, and weight, recording them as well as other pertinent information that will be valuable to the geriatric team. But perhaps her most important job in this 20-minute interview is to communicate the clinic's approach to the patient and determine his attitude toward accepting treatment and instruction.

She may notice that the patient is neatly dressed and well groomed, that he appreciates

a comment on his appearance, that he exhibits some stiffness of joints as he seats himself, and that he wears glasses and dentures. But she is also aware that he is a person, with varying physical and mental abilities, needs, feelings, attitudes, and capacities.

Past experience has taught the nurse that one of a patient's foremost fears is "what the doctors found or what laboratory findings revealed." Her own behavior in this conversation may either intensify those fears and anxiety or stimulate revelations which may prove pertinent.

Many interviews have taught her that older people love to talk about their experiences and sometimes it is difficult to focus their attention on a question long enough to get a direct answer. Often, patience and tact are necessary to recall the patient to the original question, although permitting the patient to ventilate his emotions has a therapeutic value.

The nurse's goal in the first interview is to present to the clinic team a profile of the patient's immediate medical problems and his economic, social, and cultural background, and to explain to the patient the various services of the clinic and the regional office. On the patient's first visit she will merely outline these services. At subsequent interviews and referrals to other medical and nursing services, she will devote more time to clarifying the scope of services, utilizing visual aids and emphasizing health measures. After the interview the patient is escorted to the waiting room to be called later to the clinic room.

The nurse then joins the team in the clinic room and listens to the medical review of the patient presented by the staff geriatric consultant, the chief of the clinic. The anecdotal record of the nurse-patient interview is also read. After evaluation of both reports, the patient is escorted into the clinic room and introduced to the staff. The chief of the clinic explains the team approach to the patient and its significance to his health and welfare. The patient is then given a future appointment for medical supervision, and arrangements are mapped out for the integrated services of the team according to the chief of clinic's recommendations. Clinic visits are usually 4 to 5

weeks apart. Approximately 10-12 patients attend each weekly session of the clinic.

The nurse has a short conference with the patient after he has left the clinic room to ascertain his reaction to this type of medical care and to be sure he understands the medical orders. Occasionally she finds he has already been prepared for the clinic by his friends in the waiting room or has heard about it from his comrades in the Spanish-American War veterans organization. A majority of those veterans hold office or attend meetings of the various camp units along the California coast.

The nursing assistants of the regional office are unofficial members of the geriatric team, but they assist in many ways. The male nursing assistant, under medical and nursing supervision, gives direct service to the patient in minor surgery, genitourinary treatment, proctoscopic examinations, and orthopedic steroid therapy. He prepares the patient and the instruments for these treatments, and, before a physical examination, helps a patient who may have difficulty in undressing. The nursing assistants help not only in the geriatric clinic but in other specialized clinics and in the general medicine practiced in the regional office.

Services Within the Regional Office

As counselor and coordinator, the nurse explains the medical program of the regional office and other services of the Veterans Administration to the patient during subsequent visits. The patient may have been referred by the chief of the clinic to have his eyes examined, his hearing tested, or his dentures examined. The nurse is aware of the importance of prosthetics and sensory aids to these patients. For example, when she noticed a significant drop in the weight of one patient, he confided to her that his dentures were loose, and he only wore them during his clinic visit. He had been eating baby food for the past few months. This information was brought to the attention of the clinic physician who referred the patient to the dental clinic.

The mental hygiene unit of the regional office provides a psychiatrist who conducts group therapy for the geriatric clinic patients. A social worker acts as co-leader. The patients

meet informally with the psychiatrist before the clinic sessions begin.

Responses to the group therapy vary. The patients are remarkably self-reliant and reticent in discussing their difficulties before a group. Usually the discussions center around the trials inherent in caring for their aging wives or about their difficulties in adjusting to being a secondary member of someone else's household. When they talk about themselves, they are surprised and relieved to realize they have so much in common with others.

Many surgical services are available to the patients of the geriatric clinic, and surgery can be scheduled at the mutual convenience of patient and surgeon. The surgeon on the staff is qualified in general, plastic, hand, genitourinary, proctological, and orthopedic fields. In general, hand, and plastic surgery, biopsy and diagnostic procedures can be performed. Diagnostic proctological procedures such as sigmoidoscopy, biopsy, treatment of thrombosis, and external anal afflictions, and genitourinary procedures such as care and followup of external urinary fistulae, soundings, and strictural dilations are done in the surgical clinic. In orthopedics, controlled steroid injection therapy is administered to multiple joints.

Since discontinuance of the nutrition service in 1955, the clinic nurse has assumed the responsibility, with the cooperation of the chief of the clinic, of reevaluating diets at appropriate intervals. Each diet is modified to conform to changing medical requirements and to the patient's tolerance for certain foods.

Other services are available to the patient in such special fields as allergy, dermatology, arthritis, urology, tuberculosis, diabetes, orthopedics, prosthetics, and sensory aids. Special needs are determined by the chief of the clinic and appropriate referrals are made.

Extramural Services

The hometown medical care program of the Veterans Administration is the extramural service for patients of the geriatric clinic and for eligible veterans of the two World Wars and the Korean conflict who are unable to travel to the regional office or who may require emergency care. In fiscal year 1956, more than 554,000 VA patients received hometown medical

care at a cost of \$6,290,133. Of this amount, \$699,735 was spent to care for 62,769 veterans of the Spanish-American War (2).

All geriatric clinic patients, and especially those with a history of heart disease, are informed about the hometown medical care program. The nurse explains the communication necessary between the physician in the patient's community and the authorization officer in the regional office. The patient is also reminded to make his immediate family aware of the program so that they can act in an emergency. The assurance that medical services can be provided in their homes is important to these patients. As they grow older, their homes are more important to them and severance of ties with them are often traumatic.

In an emergency, communication between the authorized fee-basis physician (usually the family physician) attending the patient at home and the chief of clinic may provide the fee-basis physician with the current medical diagnosis, history of illness, and results of laboratory tests, and thus prevent expensive, repetitive tests and examinations.

Fee-basis physicians are usually selected by the patient, and in most instances are the family physician. If the patient does not have his own physician, the Veterans Administration provides him with a list of three in his community, and he selects one of these. At the present time the selection of physicians is limited to those who are members of the California Physicians Service.

Community home nursing services are an important component of the hometown medical care program. The regional office, which has contracts with various community health agencies, can arrange for home visits by members of a visiting nurse association. If there is no such agency in the area where the patient lives, visits by a registered nurse or a licensed vocational nurse can be arranged.

The clinic, the hospital, or the authorized fee-basis physician may indicate the need for home nursing services. The referral for such services, made by the chief of the clinic, may be for the purpose of administering special medication intramuscularly or for followup of prescribed treatment that has been demonstrated to the patient by the clinic nurse. If

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their services under the community nursing program. This was an increase of \$8,251 over the 1954 cost to the Government and is evidence of the increased use of the home nursing service. But this represents an important reduction in the cost to taxpayers when compared with the cost of the hospital care that would be required."

Volunteer Service

The San Francisco regional office has an active volunteer service of 35 members who represent various organizations. Two volunteers are from the auxiliary unit of the United Spanish War Veterans. The geriatric clinic patients know them both as widows of men who have been active in camp affairs. They package gauze abdominal pads, applicators, and other requested materials, meeting a quota of 3,000 packages a month which are sent to eligible veterans.

They assist in other ways. For example, recently the colonel, a 94-year-old veteran who lives alone in a single room, seemed to be getting weaker by the day and was confused at times. He had an ambivalent feeling about going to the California State veterans home and had twice canceled plans to go there. Each afternoon for 3 weeks he hobbled eight blocks to the regional office and reported to the emergency bedroom to rest and eat the milk and crackers the volunteers served him.

Concerned about him, one of the volunteers contacted his friends in the camp and explained the colonel's predicament. When the camp members visited him, he said he wanted to go to the veterans home, but was worried about his thousand pounds of baggage. The members assured him they would take care of his belongings. Although the physician, nurse, and social worker had tried before to arrange domiciliary care, the colonel was not ready to move until the camp members, alerted by the volunteer, took action.

Two of the volunteers are men. One has charge of the storage and distribution of various health pamphlets to racks throughout the building. The other, a retired pharmacist, gives his time in the pharmacy packaging stock medicines which are sent by mail to veterans whose physicians have requested the medicine.

The regional office has found that volunteer duty is a useful form of rehabilitation in geriatrics and should be encouraged. Assigning a volunteer a definite responsibility and making sure he knows that others are depending on him gives him satisfaction in his work.

Conclusions

The experiences of the public health nurse in the geriatric clinic have been rewarding. She uses skills in health education, teaching, interpreting physicians' orders, and planning with the patient.

She understands that the patient of advanced age has many needs. Indirectly she has shared many of the problems of these patients and has tried to give them guidance. She has learned that they wish to remain independent and assume responsibilities, despite physical and social stresses.

She has learned how these veterans acquire hobbies to compensate for lonely hours, and how they fulfill social needs in the camps of the Spanish-American veterans' organization.

The clinic provides an insight into the geriatrics of the future. The Spanish-American War veteran has challenged the clinic to give him more years to live. The World War I veteran, on the periphery of geriatrics, presents a similar challenge.

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home care is needed following a hospital stay, the ward nurse usually explains the home nursing care that is available. Final arrangements for home visits are the responsibility of the chief of the nursing unit of the regional office, who is familiar with the resources of the neighboring communities. Fee-basis physicians' requests for home nursing service go to the chief of the nursing unit of the regional office.

The following case report illustrates the importance of continuity of medical and nursing care in the home.

Mr. W., 83 years of age, had been attending the geriatric clinic for about 5 years. In November 1956 he complained of chest pains and a "loose cough." His established diagnosis was arteriosclerosis and hypertension. An X-ray revealed a mass in the right side of his chest. He was referred to the nearest Veterans Administration hospital for further studies, and the final diagnosis was pulmonary metastasis, primary, undetermined. The hospital physician explained to Mr. W.'s wife and daughter that further treatment was impossible because of the patient's age and the possible complications.

After Mr. W. was discharged from the hospital, the family physician requested weekly home nursing visits for general bedside care, intramuscular injections, and health guidance to the family. Mr. W.'s wife, 80 years of age, and unmarried daughter, 50, who supported the family financially and did the housekeeping as well, were eager to have supportive care.

The chief of the nursing unit contacted the visiting nurse service by telephone, and home nursing care for Mr. W. was started within an hour. The visiting nurse reported to the regional office that the wife and daughter had received her warmly. She had instructed them in maintenance therapy to prevent decubiti, joint stiffness, and loss of self-care ability and pointed out the importance of keeping medicine beyond Mr. W.'s reach, for he became confused at times.

She reported the family had missed Mr. W. when he was hospitalized, were happy to have him at home, and felt they could care for him with a little help from her. Mr. W. stated he would soon recover since he was at home. The visiting nurse association submits a monthly

bill of \$16, and the fee-basis physician's home services cost \$24 a month. Each visits Mr. W. four times a month.

This case demonstrates the teamwork of the hospital, family, fee-basis physician, the community service agency, and the staff of the regional office in the extramural medical treatment program of the Veterans Administration. The visiting nurse is in close contact not only with the attending physician but with the chief of nursing unit in the regional office. Medical orders, prescribed treatment, health instruction to the family, evaluation visits, determination of the number of visits, and environmental factors are discussed with the chief of the nursing unit at intervals.

From the patient's standpoint, the success of the home nursing care is measured by the satisfaction he derives from it. About one-fourth of the cases on record in the regional office are those of Spanish-American War veterans. Periodic telephone calls to patients have assured the office that they are satisfied with the home nursing service.

Dr. E. M. Bluestone has said that when we permit a patient who has reached the terminal stages of his illness, and who still enjoys illusions of hope, to be maintained in familiar surroundings where he can be cared for by himself and his family, we are moving in the right direction in extramural service (3).

In fiscal year 1954, 932 patients throughout the VA received home nursing care at a total cost of \$88,001.82. The average cost per visit was \$2.58, which was considerably below that required to maintain a patient in a general medical and surgical hospital during that fiscal year. Average hospital cost for this period was \$19.84 per day (4).

The number of patients who receive community nursing service has increased since the program was organized. According to a report in *Nursing Outlook* (5), "The monetary value of home nursing services cannot be estimated in terms of the individual veteran's and the community's health and happiness. The average fee per visit was \$2.67 in 1953, which is an increase of 9 cents over the 1954 and 18 cents over the 1952 cost per visit. The Government paid a total of \$96,251 to contracting public health agencies in the fiscal year 1955 for

A demonstration underway in Connecticut is proving the value of voluntary consultation as a means of upgrading the standards of community hospitals.

A Project in Voluntary Consultation for Hospitals

JOHN T. FOSTER, M.P.H., and JANE HARTMAN, M.S.

IN 1955, leaders of the Connecticut Hospital Association felt that a need existed among their 33 short-term, member hospitals for guidance in dietary and personnel practices. An application was submitted to the Public Health Service requesting a grant whereby two specialists could be added to the staff of the association to provide voluntary consultation services to member hospitals.

The application stated, "There exists today a hiatus in most parts of the country between the recommendations of the experts and the actual operation in the individual hospitals. Most hospitals are small and cannot afford highly trained department heads or experts in all fields to take advantage of the many recommendations. This is particularly true in personnel and dietetics." The application further stated, "The value would be measured not only by improved personnel and dietary practices, but also through financial savings in the individual hospitals."

Mr. Foster, assistant administrator at the Stamford (Conn.) Hospital, was a student in the Yale University program in hospital administration at the time of the study. Miss Hartman serves as food service specialist in the project for improved dietary administration at the Connecticut Hospital Association. The study was supported by a Public Health Service research grant (W-7, C-2).

A 2-year grant was awarded in April 1956, and, based on initial results of the project, a 1-year extension was approved. The association is studying the possibility of financing the program on its own on a permanent basis.

Consultation services, as such, are not new. In hospital administration alone consultants flourish on a fee-for-service basis in many fields, including architecture, dietetics, fund raising, public relations, personnel, and accounting. These private consultants may have difficulty in obtaining clients. Once they have a contract in hand, however, they gain psychological advantage over the client, who is anxious to justify expense by obtaining value in return.

A similar receptivity is enjoyed by another type of consultant, the specialist working under the auspices of governmental regulatory agencies. When consultation is coupled with licensing, there is an implied sanction that would seem to give the consultant some advantage in acceptance.

Voluntary consultation, lacking both the financial involvement of the client and the sanction of licensing, is acutely dependent upon the effectiveness of the consultant and the degree of the client's need. This potential weakness of the project was recognized by the association at the outset.

A retrospective evaluation of the first 18 months of the dietary phase of the two-part

Epidemiological Notes

Plastic Film Hazard

Filmy plastic bags, used by dry cleaners and food packagers, were brought to public attention as a household hazard when Dr. James F. Benedict of Erie County, N.Y., was quoted in the *New York Times*, August 29, 1958. He referred to two infants suffocated by such wrappers.

At the October 1958 meeting of the National Safety Council, a delegate issued a warning and mentioned an accidental suffocation said to have been caused by a plastic bag. Four more deaths were cited by Dr. Paul B. Jarrett, chairman of the Maricopa County Medical Society Accident Prevention Committee, in the *Arizona Republic* of January 4, 1959. All of these were infant deaths occurring in the vicinity of Phoenix. Later in January, Dr. A. B. Rosenfield of the Minnesota Department of Health reported to the press that two infants had been suffocated by makeshift pillow covers made from plastic bags.

The use of the bags as covering for bedding appears to have been a contributing factor in many of these infant suffocations. In other cases, babies have managed to grasp plastic bags lying nearby. Suffocation occurs when the limp film clings to the mouth and nostrils. Even toddlers, playing with this thin plastic, have become enmeshed in it and suffocated themselves. The increase in such deaths corresponds with the rise in sales of thin plastic bags. The dry cleaning industry alone bought 600 million in 1958 but almost none in 1955.

In early February 1959, a letter directing attention to the Arizona report was circulated in the medical and health field by Dr. B. H. Conley, secretary of the Commission on Toxicology, American Medical Association. On February 26, the Public Health Service began investigation by requesting its regional offices to seek further information on incidents of this nature through State health departments.

During March, April, and May, reports of more accidental suffocations appeared in quick succession. Additional cautionary statements were issued by health agencies, officials of local medical societies, the National Institute of Dry Cleaning, and the Society of the Plastics Industry. Following the suffocation of a 10-week-old infant in Windsor, Ontario, the Canadian Press reported May 24 to the *New York Times* that the dry cleaning concern affected is abandoning the use of plastic wrappers.

A telegraphic survey of State health officers by the National Safety Council on April 20 brought to light at least 20 accidental suffocations since January 1, 1959, which were reported on the death certificates as due to some sort of plastic film. By the end of May the list of such tragedies had grown to 35 for 1959, according to information received by the Accident Prevention Branch of the Public Health Service. At that time, the known count for 1958 and 1959 was 55 accidental suffocations and 3 suicides reported to have involved plastic film.

The Public Health Service began epidemiological investigation of deaths reported from this cause early in May with the cooperation of State and local health departments. Results of intensive study of seven of these deaths have convinced Service officials of the need for public education to prevent future tragedies of this kind. A cautionary leaflet, "Plastic Film—Correct Use and Mis-use," prepared in cooperation with public and professional organizations by the Society of the Plastics Industry, is available without charge for distribution through public health agencies.

Despite the apparent involvement of plastic film, it is not clear that mechanical suffocation was the true cause of death in all the instances mentioned for 1958 and 1959. A wholly accurate measure of the death toll from plastic film would have been possible at this time only if all infants who died in circumstances suggesting suffocation from it had been examined postmortem by pathologists. In the past, studies of sudden deaths of infants have demonstrated that a significant proportion of those believed due to mechanical suffocation may have resulted from acute respiratory infections, such as tracheobronchitis and acute interstitial pneumonia. In view of these facts, postmortem examination of infants believed to have died from mechanical suffocation is highly desirable.

Of the 51 individual standards on the check-sheet, only 3 items were complied with by all the hospitals. All hospitals met the requirement that modified, therapeutic diets be ordered in writing by the physician, and that available funds be provided for nutritionally adequate meals.

At the same time, not one of the 33 hospitals met the ADA standard specifying that the dietitian write comments on the patient's medical chart, obviously a matter of regional medical practice of long standing. Only 24 percent of the hospitals were conducting adequate inservice training.

The class III hospitals were notably low in organization and personnel practices. But they ranked high in facilities and conferences, and ranked well in the remaining categories. These differences seem significant. One can understand relatively low ratings in staffing for the two groups of smaller hospitals, since qualified dietitians are a requirement. Few of these, one can speculate, have been able to obtain or afford dietitians. Funds alone do not explain the deficiencies in the smaller hospitals, however, as demonstrated in the relatively high standing of these groups in facilities where they exceeded the scores of the class II hospitals. The class II group was especially interesting; while ranking high with class I in staffing, it fell below norms in other areas. It should be noted here, however, that this group's deficiency in facilities was already being attacked through a number of building or remodeling programs to which they were committed in the fall of 1956.

Averages are useful as an indication of general patterns, but can hide wide variations within a group, and this is true of the arbitrary groupings that have been used. Class I and class II hospitals in particular ranged widely in their total scores on the checksheet completed by the specialist in her early visits. While two class I hospitals ranked high, with 47 of a possible 51 points, one hospital in the group ranked with the lowest with only 20 total points. A hospital in class II had the lowest total score of all 33 hospitals, a total of only 14 points of compliance.

In addition to observing checksheet phases of dietary operation, the specialist found that other dietary problems existed in enough of the

hospitals to make additional goals important. Such a problem was scheduling of the patient's meals. One criterion of hospital care applies to the minimizing of the inevitably large number of adjustments a patient must make as he enters the hospital world. The average patient might be expected to complain when he finds breakfast arriving between 6:30 and 7:00 a.m., a heavy meal arriving at 11:30 a.m., and a light "supper" arriving at 4:00 or 4:30 p.m. Schedules such as this were all too common.

Sanitation and housekeeping were covered by the checksheet, and the specialist was struck by the severity of some of the problems in this area. Several problems were architectural, but the majority were the result of attitude. Compounding the difficulties was the fact that few cities provided really close inspection by sanitarians. The overall average compliance of 48 percent with the item on regular inspection by a sanitarian seems somewhat inflated when it is recognized that once-a-year inspections were accepted as the norm by the specialist. Most would argue that regular inspection at least twice a year plus in-between "drop-ins" should be a minimum. Such standards were, however, typical of the Connecticut communities as she found them. At one large teaching hospital the specialist found a model purchasing procedure for canned foods. Purchasing was based on carefully prepared specifications, bidding was competitive, and sample cans were "cut" and evaluated for color, flavor, composition, and other criteria under carefully controlled conditions. Contrasted with this model system for assuring both quality and maximum use of the available food dollars, few hospitals were using competitive purchasing for either quality or cost control. This, therefore, became another area of concentration and subsequent service.

The checksheet covered standardized cost accounting for food only in general terms. This became still another area of effort, in which the specialist was aided by the Connecticut Hospital Association's accounting specialist throughout the study.

In summation, a wide variance in compliance with standards of the American Dietetic Association was found in Connecticut hospitals.

project was undertaken as an academic project by the senior author, a student in the course in hospital administration of the department of health, Yale University. The final report records notable gains in a majority of the hospitals. The achievements indicate that voluntary consultation can be effective when properly organized and conducted.

Start of the Project

As the food service specialist, the Connecticut Hospital Association selected a member of the American Dietetic Association who had been food service director with the Maryland State Department of Health. Her services began in September 1956 with a "get acquainted" visit to each of the 33 hospitals and a survey of the quality of their dietary programs.

To provide a frame of reference for the project, the sponsors selected the "checksheet for the hospital department of dietetics," devised by the American Dietetic Association. The checksheet, considered a summation of essential criteria, represented exhaustive study and research by a special committee of the association beginning in 1954.

The checksheet represented 51 items divided into 6 main categories of dietetic administration. The six areas of special interest but of varying degrees of relative importance were organization, facilities, personnel, records, management policies, and conferences.

Items related to organization were designed to evaluate the qualifications of the dietitian and the effectiveness of supervision. Sample questions were: Is there a written organization plan designating areas of authority? Is supervision designated for all working hours?

Regarding facilities, the items recorded the way the food was received, stored, prepared, cooked, and served. Dishwashing and disposal equipment and methods were judged as well as the adequacy of the size of dining areas and communication equipment.

Questions on personnel determined, for example, whether the department was subject to a labor-hour budget, whether the nonprofessional personnel assignments were evaluated periodically to assure sufficient employees, and whether there was an adequate number of stenographers and clerks so that professional staff

time was not used for these duties. The application of an employee merit-rating system was also checked.

The items on records asked about the accessibility of pertinent records and checked practices in accounts and inventory recordings. The following were representative queries: Is a record of all menus, as served, filed for a reasonable time? Are regular and modified menus checked for nutritional adequacy and patient acceptance? As an alternative to a perpetual inventory system, is an adequate inventory of another type maintained? Has the dietitian access to medical charts?

Sample questions under management policies asked the following: Are all patients on routine and modified diets visited at frequent intervals? Do you use written communications to make suggestions, to confirm oral discussions and decisions, to present reports, and as reminders?

The conference group of items measured the level of communications and cooperation among the dietetic, administrative, and medical staffs of the hospital. The following questions were representative: Does the dietitian in charge of the department of dietetics attend the administrator's conferences? Are staff conferences for the department of dietetics held periodically?

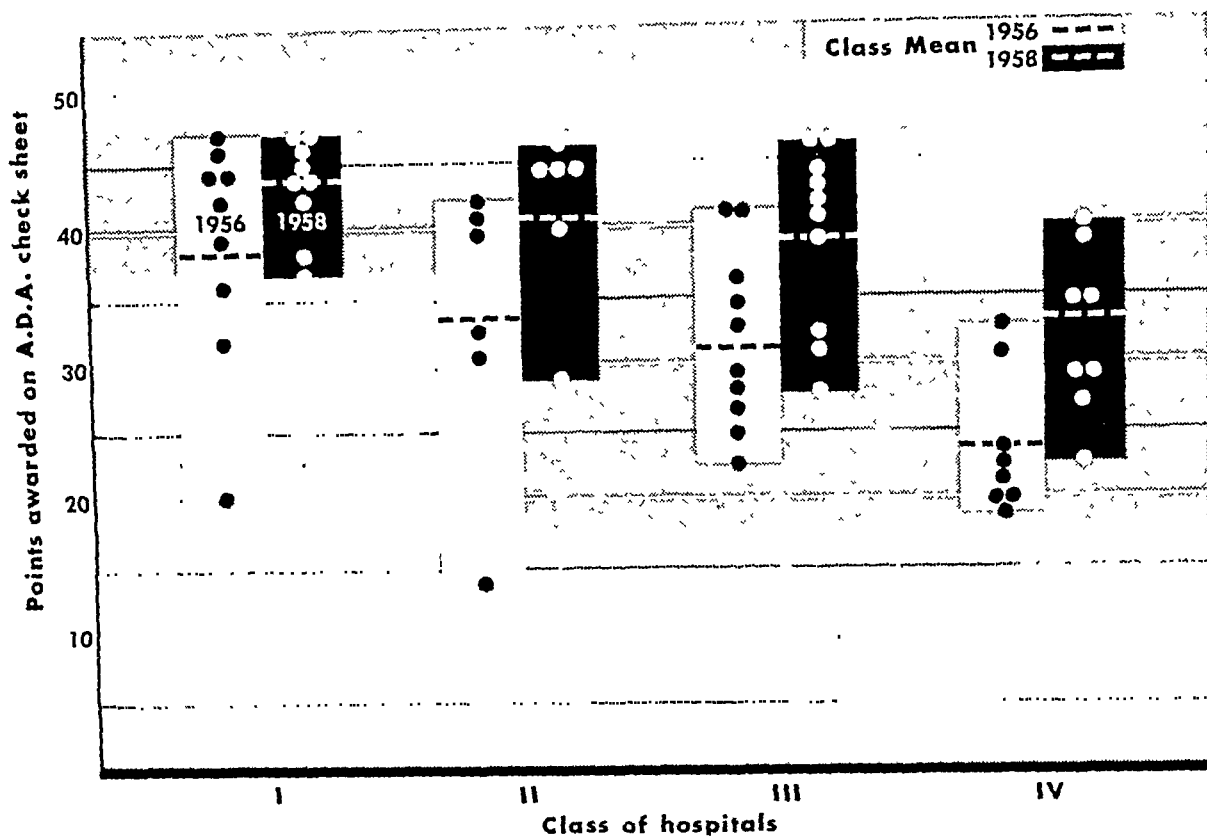
Subsequent to the Connecticut hospital study, the checksheet was expanded and refined to increase its utility as a measurement tool for dietary consultant services on a continuing basis.

The 33 hospitals were grouped by size because of the wide range in number of beds (and thereby of financial structure). The size ranged from more than 700 to fewer than 40 beds. The four categories established were class I, with 300 or more beds, 9 hospitals; class II, 200 to 300 beds, 6 hospitals; class III, 100 to 200 beds, 10 hospitals; and class IV, 99 or fewer beds, 8 hospitals.

Initial Survey Results

The initial survey in 1956 disclosed a wide range of compliance with the 51 individual items among Connecticut hospitals, from a low of 14 "right answers" for one to a high of 47 for another. The mean score was 31.9 and the median 31.

Figure 1. Comparison of raw scores¹ in initial survey (1956) and in followup survey (March 1958) made by 33 member hospitals of the Connecticut Hospital Association.



¹ Ratings by dietary specialist.

A major item under staffing is the requirement that the hospital dietary department be headed by a qualified dietitian. The fact that this was unchanged quantitatively during the study period (15 of the 33 hospitals met the requirement) does not reflect the extent to which the dietary consultant helped recruit dietary personnel. Three qualified dietitians were recruited to replace head dietitians who resigned during the period, and 12 subordinate dietary supervisors were found. Other improvements in the category of organization brought the score for this area from 49 to 65 percent despite the lack of change in the one requirement.

Gains noted in the other areas were facilities, 62 to 84 percent; personnel, 52 to 71 percent; records, 70 to 81 percent; management, 65 to 73 percent; and conferences, 62 to 69 percent.

Several hospitals at the end of the report period had greatly improved the scheduling of meals for patients so that there is no more

than 14 hours between the serving of the evening meal and breakfast. Notable throughout the State were the generally higher levels of housekeeping and sanitation. These resulted from the direct consultations and inspections by the specialist, and particularly from the in-service training programs which were developed by many of the hospitals based on the training outlines the specialist had prepared and published.

In cooperation with the hospital association's accounting specialist, a monthly food cost analysis report was developed. By the end of the report period the majority of larger hospitals in the State were submitting these reports. The reporting required standardization of food cost accounting practices in these hospitals, which in turn reflected the increasing awareness of the importance of controlling food cost.

In one hospital, the specialist found that al-

In general, larger hospitals ranked more favorably than the smaller hospitals, but this was not true in all cases for all criteria. Conditions were not "bad," but it was clear not only to the food service specialist but also to others associated with her that the original premise of the application had been valid. The administrator of one hospital, a member of the project committee, commented: "I was appalled to think that some of the things I have heard about could exist in our hospitals." Not all conditions were appalling, but certainly the survey confirmed the need expressed in the original application for improved dietary administration. The challenge and the opportunity to improve conditions were clear.

Consultation Methods

A consultant in a field such as dietetics can approach a client with either of two basic methods: with a "package program" for the client to accept or reject, or with an open mind for the client's interpretation of his needs and an attempt thereupon to find solutions tailored to his situation. The latter method is more passive and also meets the accepted criterion of teaching—that people learn more readily when they are participants in selecting the topic. It also places greater demands upon the consultant's adaptability and professional skills, although most consultants will tend to combine both methods in varying degrees. It was the second approach that primarily characterized the consultations provided by the dietary project.

Working both with the administrator and the dietitian of the hospital, the food service specialist made a total of 290 consultation visits. This averaged four per working week, and when travel time is included each visit took the better part of a working day.

Training conferences for the dissemination of new methods and for the sharing of solutions to problems was, from the beginning, one of the expectations of the sponsors. Five statewide meetings, one of these lasting an entire working week, and 14 regional meetings were held during the 18 months.

As the specialist became increasingly involved in the need for inservice training, in addition to conducting 15 demonstration train-

ing sessions, she prepared a series of training guides which were distributed to all member hospitals. These guides were also published in the *Modern Hospital*, May 1958.

From the outset, a written report was maintained on activities and progress. Also, a detailed narrative report summarizing each consultation visit was made part of the association's permanent file.

Further demands upon the food service specialist came not only from her professional affiliations but from a variety of State groups. Demonstrating the latent demand for guidance in this professional area, these requests were for consultations with special hospitals affiliated with the Connecticut Hospital Association, with State institutions, and with nursing homes.

Other unanticipated functions which took on increasing importance as the various hospitals gained confidence in the service offered were those of architectural consultation and equipment planning. Ambitious building programs of the hospitals created the need for the specialist's professional guidance that administrators found useful over and above the advice of architects and even of paid food service consultants. In one notable case, the dietary specialist reduced a hospital's equipment costs for a new kitchen by about \$75,000.

Resurvey Results

The resurvey of the hospitals at the end of the first 18 months of the dietary project showed an upward shift of standings. From an overall compliance of 62 percent in 1956, the mean for the 33 hospitals climbed to 76 percent in early 1958. Only 1 of the 33 hospitals failed to improve its score, a class I hospital with a near-perfect score of 92 percent in the first survey. The range in raw scores which had covered 65 percent of the scale in 1956 decreased to 46 percent in 1958 (fig. 1).

The mean scores of the hospital classes increased from 38.8 to 43.3 in class I; from 33.2 to 41.2 in class II; from 31.7 to 39.2 in class III; and from 23.5 to 32.1 in class IV. As expected by the sponsors, the largest proportional gains occurred among the smaller hospitals.

Gains were also made in each of the special areas in every hospital class.

were, in 1956-57, at a peak in Connecticut as the result of the Hill-Burton program and, to a lesser extent, the hospital grants of the Ford Foundation. Eight of the 33 hospitals were already committed to major reconstruction or expansion at the outset of the dietary project.

In an effort to arrive at a more direct relationship between the dietary project and improved facilities, figure 2 shows three values: the 1956 compliance with facilities criteria, the gross compliance in the 1958 survey, and a "without construction" score for 1958 from which the more obvious effects of capital improvement have been deleted. While smaller, the gains again occur consistently in each hospital class.

Acceptance of the Specialist

Fully aware of the need to establish acceptance, the specialist made clear to each administrator that her services were available. There was wide variation in the response.

At the various educational conferences, a total of 546 persons attended. They included 90 administrators in addition to the dietary personnel. All hospitals were represented in at least one of these meetings and 80 percent of class I hospitals participated in the statewide meetings. The larger hospitals, however, were represented by more people than the smaller at these conferences. The smaller hospitals, on the other hand, were less apt to have professional dietitians and proved therefore to be the most responsive to professional guidance. The hospitals with building programs made the greatest demand for equipment and layout advice.

The relationship between the specialist and the administrators reflected a wide range of attitudes on the part of the administrators. There were those who were unwilling to acknowledge any problems, those who requested advice but were unable to apply it, and still others who were receptive to advice and effective in putting guidance into practice.

A Case in Point

An idealization of effective consultation is the experience with a 70-bed hospital, where much

was achieved and credited by the administrator to the specialist.

In addition to improving dietary services, a major hope of the sponsors had been to reduce dietary costs. In this hospital, the adoption of controls and rescheduling of personnel brought these financial changes:

Year ending	Salary and wages	Supplies and expenses	Total
September 1956.....	\$38,322	\$38,682	\$77,004
September 1957.....	34,662	30,983	65,645
Reduction.....	3,660	7,699	11,359

Significantly, this hospital was the only one of the 33 to reduce the total costs per patient-day during the years in question. The reduction was about equal to the amount saved in the dietary department. Unquestionably, inefficiency had existed there before, but it was the specialist who brought it to the attention of the administrator and showed him ways to correct his problems.

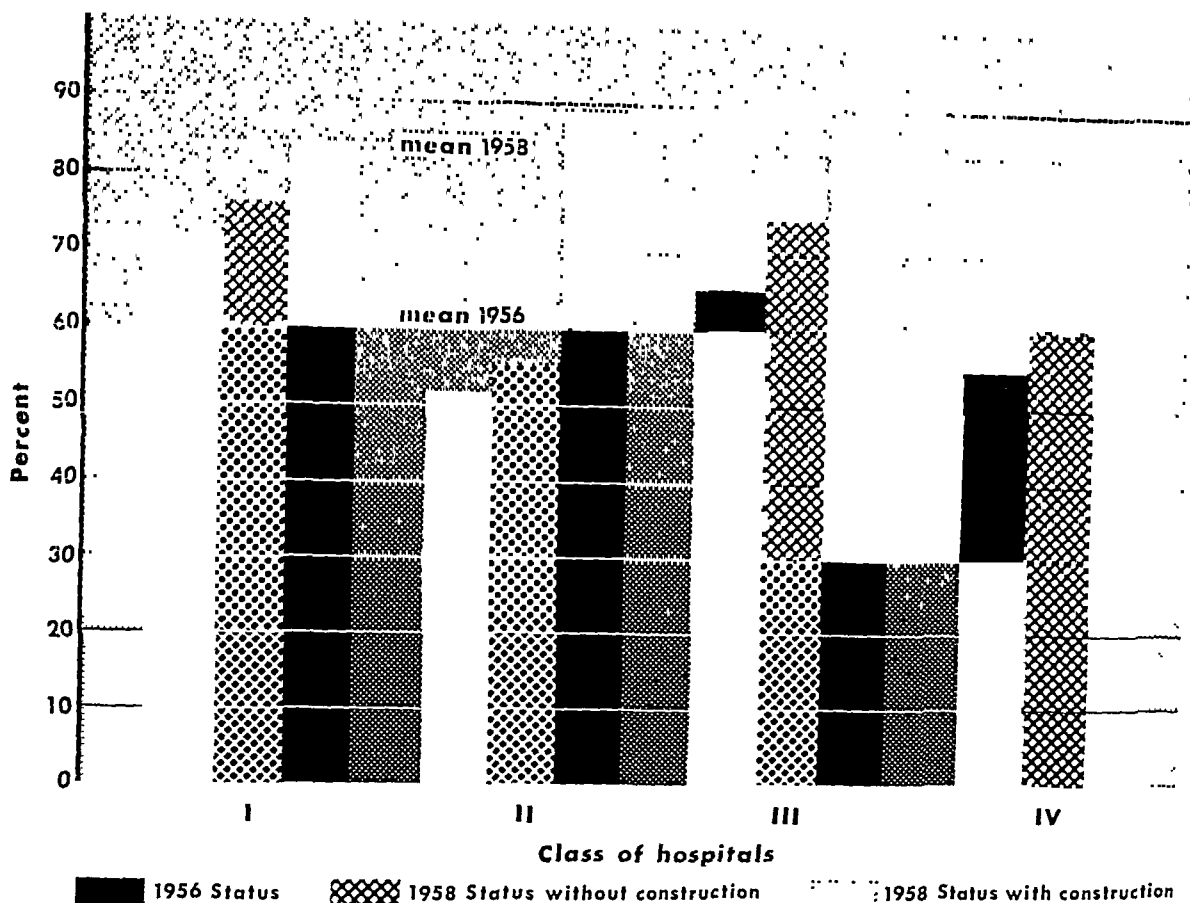
In the period under survey, this hospital (a) adopted a written organization plan designating supervisory responsibilities; (b) rearranged storage space; (c) obtained more efficient kitchen equipment; (d) improved dishwashing procedures; (e) instituted systematic equipment maintenance and replacement; (f) placed the dietary department on a budget; (g) adopted new menus for improved nutrition and patients' acceptance; (h) began nutritional education for patients; (i) provided a food preference system for each patient; and (j) adopted inventory controls.

Success Factors

The Connecticut demonstration has more than met the expectations of its sponsors. Although not every one of the member hospitals made maximum use of the proffered services, requests for service from member hospitals have accelerated beyond the heavy demand of the first 18 months. What are the factors that made the program work?

Qualifications of the food service specialist. Voluntary consultation places heavy importance on the ability of the consultant to obtain the respect of both professional peers (in this case, dietitians) and of business-oriented administrators. At the cost of a 5-month delay,

Figure 2. Comparison of percentage compliance by hospital classes with checksheet standards for facilities for 1956 and for March 1958.



though the dietary department maintained high food standards, the actual responsibility for preparing and serving breakfast rested with the housekeeping department, which served the noon and evening trays prepared by the dietary department. After a man-hours study, this hospital was able to revise the entire system, so that the full responsibility rested with the dietary department, at no increased cost in personnel. It is generally accepted that there is a particular advantage in placing full responsibility on the dietary department for the condition of the food as it reaches the patient. Similar special studies were conducted in other hospitals, to the same end, and in addition in-service training and regional educational programs all helped instill in the dietary personnel increased awareness of the importance of not only preparing the food well, but of serving it attractively.

Although direct cause and effect relationships between the dietary project and these improvements cannot be proved, the consistency of the changes suggests more than circumstantial evidence of the program's value. Other influences cannot be denied. All hospital administrators are subject to constant pressure to improve services. Certainly, a constant barrage of ideas in all aspects of hospital administration is presented by a variety of publications and professional associations. Many of these influences had existed long before the dietary project but did not obtain wide acceptance in the area until this individual consultation service program began.

In one specific area, however, a clear bias in the results is evident. This was in the improvement of facilities. The largest gains were noted here. It is necessary to recognize the effect of hospital construction projects which

The immediate past president of the American Medical Association reports on organized medicine's programs in the fields of chronic illness, aging and health care of the aged, school health problems, and medical research.

American Medical Association Report

GUNNAR GUNDERSEN, M.D.

SINCE its founding in 1847, the American Medical Association has steadily expanded its activities and services aimed at furthering the organization's primary objectives "to promote the science and art of medicine and the betterment of public health." These programs have multiplied at an ever faster rate during the past 30 years of rapid medical progress.

The changing dimensions of medical knowledge and the accelerated pace of technological progress already have made it difficult for physicians, public health workers, and other health personnel to keep abreast of scientific advances. Now the picture is being further complicated by a multitude of social, economic, and legislative problems which require intensified effort by all concerned.

More than ever before, medicine is intertwined with the worlds of business, industry, labor, government, economics, public opinion, and public affairs. In meeting this situation, the American Medical Association for more than a year has been reorganizing its administrative structure in order to serve both the profession and the public with the greatest possible efficiency and awareness. Under seven

Dr. Gundersen, who completed his term June 9, 1959, is the 112th physician to serve as president of the American Medical Association. With three of his five brothers who are also physicians, he operates the Gundersen Clinic in La Crosse, Wis.

new divisions, business, law, field service, communications, scientific publications, scientific activities, and socioeconomic activities, approximately 40 or more councils, bureaus, committees, and departments will be engaged in a coordinated effort to solve current and future problems in medicine.

It would be impossible in this article to cover even the highlights of all these programs, which were detailed in 300 pages of annual reports in the House of Delegates handbook at the AMA clinical meeting in December 1958. This report, therefore, will focus attention on what the association is doing in such fields as chronic illness, aging, school health problems, and research.

Chronic Illness

The medical and public health progress of the past half century has brought drastic cuts in the incidence and death rates of most communicable diseases. It has sharply reduced infant and maternal mortality. On a wide front it also has produced countless advances against many other diseases that once were serious health problems. As a result, average life expectancy at birth has increased about 23 years since 1900, and there has been a steady rise in the proportion of people living into middle and old age.

Consequently, general medical emphasis in

the Connecticut program was allowed to begin only after the sponsors were satisfied that they had found a consultant with the right personal and professional qualifications.

Existence of real need. Stimulus for the Connecticut project was the increasing participation of food management firms in hospital dietary programs. The fact that such firms could move into an area of hospital administration and demonstrate economic savings in spite of their fees signaled the existence of inefficiencies that needed correction. The fact that fewer than half of the Connecticut hospitals had been able to obtain professional direction for their dietary departments was a further clue to the potential value of a program that could be considered a sharing of professional knowledge and skills.

Acceptance of consultation. An accounting consultation service instituted by the hospital association in 1948 was a great advantage to the Connecticut program. This had led to a highly satisfactory program of uniform hospital accounting from which all hospitals had benefited. The success of this project had prepared the ground for acceptance of other consultation services.

Geographic accessibility. It is recognized that Connecticut offers a compact geographic pattern within which a program such as this could operate under near ideal conditions.

There is a real question as to whether a consultant could cover a larger area. Certainly, 33 hospitals are a maximum caseload. This suggests that in larger States regional hospital councils would offer an appropriate center for such a service.

Summary

To make available professional guidance in the areas of dietary and personnel administration to its 33 member general hospitals, the Connecticut Hospital Association was granted funds by the Public Health Service for a demonstration program. Based on initial results, a year's extension to August 1959 has been granted. The association is now studying the possibility of financing the program thereafter on its own.

With the services of a food service specialist, the program resulted in a variety of training conferences throughout the State, the recruiting of professional personnel, guidance to hospitals in new construction and equipment purchasing, and a marked upgrading of standards.

The results of the program would seem to demonstrate that consultation on a voluntary basis is at least as effective as consultation services by State agencies and by fee-for-service firms. Such consultation would seem, furthermore, to be a valid function of the State or regional hospital association.

PHS Nursing Research Program Expanded

The extramural nursing research program of the Public Health Service will be expanded by six new grants and support continued for three projects now underway.

Improved patient care through studies of nursing practice, nursing education, administration of nursing services, and other factors affecting the welfare of patients is the objective of the program, which was instituted in 1955.

The project sites of the six newly approved grants are Cornell University, University of California Medical Centers at Los Angeles and at San Francisco, University of Utah, and Western Interstate Commission on Higher Education, Boulder, Colo.

Grants for nursing research are administered by the Division of Nursing Resources in cooperation with the Division of General Medical Sciences of the National Institutes of Health.

developing a series of guides to aid all physicians in making proper determinations under both public and private disability insurance programs. Two of these guides already have been approved and made available to the profession.

As a final example, the Committee on Rehabilitation, with representation from several AMA councils, has outlined objectives and guides for intensified activity by the entire medical profession in the field of rehabilitation. To implement these, our House of Delegates in December 1958 approved a comprehensive plan of action for State and county medical society committees on rehabilitation.

Aging and Care of the Aged

During the past decade or more, the association's increased activity in the field of chronic illness led naturally to realization of the fact that a very large proportion of chronic illness occurs among people in the older age groups. Meanwhile, the growing number of senior citizens, plus a variety of social, economic, and political factors, began to focus more and more attention on health problems of the aged. Accordingly, the AMA House of Delegates in 1954 recommended the establishment of a Committee on Geriatrics, which was formed the following year.

At its very first meeting, however, this committee decided that it could not limit its scope to problems involved in the diagnosis and treatment of older patients. It recognized that practically no diseases are specifically or exclusively diseases of old age, and it saw that it had to think in terms of both the sick and the well. It defined its province as all facets of the aging process, physical, mental, emotional, social, occupational, cultural, and economic, and its name was changed to the Committee on Aging.

Since that time, in coordination with other committees on indigent care, medical facilities, and health insurance and prepayment plans, the AMA Committee on Aging has developed an expanding, intensified program of activities. Beginning in late 1956, it has sponsored a series of six regional conferences on aging, the latest of which was held in May 1959 in Salt Lake City. Basic purpose of these conferences,

which will continue in the future, is to present problems, stimulate medical and lay interest, learn local viewpoints, and promote the creation of active medical society committees on aging.

To speed progress, the AMA in June 1958 approved a set of suggested guides for medical society committees on aging, which provide a blueprint for organization, action, and co-operative projects. By the end of January 1959, all State medical societies and numerous county medical societies had formed such committees.

Through meetings, conferences, and continuing contact, the association has developed liaison with the Department of Health, Education, and Welfare, Public Health Service, American Nursing Home Association, American Hospital Association, Council of State Governments, National Committee on Aging of the National Social Welfare Assembly, Gerontological Society, University of Michigan Division of Gerontology, Federal Council on Aging, and many other national and State agencies interested in care of the aged.

An important result of the liaison with the American Nursing Home Association is the effort to establish and maintain high standards of medical care in nursing homes. Toward this objective, AMA staff members are making a field survey of 50 nursing homes in 22 States. Concurrently, the ANHA is conducting a questionnaire survey of about 4,500 member homes throughout the country. It is hoped that the results of these two surveys can be published this summer. On the basis of these findings, the AMA will formulate recommended guides and standards for medical care in nursing homes.

Following up on the regional meetings that began in 1956, the association last September held a national planning conference for medical society action in the field of aging. It attracted more than 175 representatives of 27 State health departments and of medical societies in 46 States and the District of Columbia. The conference approved a six-point AMA positive program calling for:

- Stimulation of a realistic attitude toward aging by all people.
- Promotion of health maintenance programs

recent years has been shifting from the infectious, communicable diseases, which used to be the great killers during infancy, childhood, and youth, to the cardiovascular diseases, cancer, arthritis, and the various forms of chronic illness and disability which can occur at any age. This trend also has produced greater attention to rehabilitation, disease prevention, and health maintenance in its most positive aspects.

As individual physicians and investigators began to center more attention on the problems of chronic illness, the American Medical Association moved to provide organized leadership in cooperation with other interested agencies. In 1946 the American Medical Association, American Hospital Association, American Public Health Association, and American Public Welfare Association established the Interim Committee on Chronic Illness. Three years later, this committee became the Commission on Chronic Illness, with representation from the general public, industry, labor, agriculture, education, religion, social sciences, journalism, health, and welfare.

The commission conducted and published numerous studies in the field of chronic illness, some of them in close cooperation with the Public Health Service. When the commission was disbanded in June 1956, the AMA continued to work on various phases of the problem. Our Council on Medical Service, for example, still publishes the *Newsletter on Chronic Illness*, which now goes bimonthly to about 6,500 groups and individuals making up a cross section of medical and allied health fields. The *Newsletter* emphasizes community programs and approaches in the area of long-term illness but now is being expanded to include more material of national scope.

The association continues to collect and maintain a resource file on chronic illness problems and answers a wide variety of requests for information. An important part of this work involves the development of organized home care programs, which provide a comprehensive array of medical, social, and rehabilitative services for patients who do not need all the services of a hospital. The AMA has published an expanded, revised edition of a 1957 survey of organized home care programs in the United

States. The new report covers the operation of 38 such programs currently underway in various parts of the country.

For several years the association has been gathering facts about central information and referral services for the chronically ill. These agencies, designed to serve patients, physicians, and all others concerned with the problems of chronic illness, function as community clearing-houses, and they also assist in factfinding studies and program planning. A survey of five such information centers now operating in Chicago, Milwaukee, Cleveland, San Francisco, and Essex County, N.J., is scheduled for publication. The AMA objective is to help promote widespread development of such centers in order to bring about better coordination in attacking the variegated problems of chronic illness.

In many ways and from various directions, numerous AMA councils and committees concern themselves with chronic illness problems. The Committee on Indigent Care, for example, publishes a steady stream of articles, surveys, and reports dealing with public assistance programs, which by their very nature involve care in chronic illness or disability. The AMA is urging all State and county medical societies to take an active part in assisting the efficient development and operation of the medical aspects of public assistance programs. Guides for medical societies have been formulated to help that effort. In a new policy action in December 1958, the association also recommended that States be permitted to combine the present four public assistance medical programs into a single medical program, administered by a single agency and making uniform services available to all eligible recipients.

The Committee on Medical and Related Facilities, among other activities, gathers facts about chronic illness facilities and nursing homes. As a result of its exhaustive study of the Hill-Burton hospital construction program, completed last year, the AMA is urging that States be given greater flexibility in meeting their needs for chronic illness facilities and nursing homes.

On still another front, the association's Committee on Medical Rating of Physical Impairment is engaged in a long-range project of

State medical societies have been urged to cooperate actively in development of the State conferences on aging which will precede the White House Conference on Aging in 1961. The association is working closely with the Department of Health, Education, and Welfare in this whole program, as well as in the development of homemaker services and nursing home classification systems. A highlight of the AMA June 1959 annual meeting in Atlantic City was a special scientific session on the medical aspects of aging. The association is pushing distribution of a new health appraisal form to stimulate increased physician participation in health maintenance programs. And the AMA itself plans sponsorship of a number of regional conferences on aging for medical, paramedical, and lay groups at some time in the near future.

In short, the American Medical Association is working hard to provide leadership for a concerted, positive, voluntary effort in the field of aging.

School Health Problems

Always interested in the health of school children, the AMA since 1911 has been cooperating actively with the National Education Association in the Joint Committee on Health Problems in Education. This committee, which met at AMA headquarters in March 1959, works to gain interprofessional recognition of principles and policies affecting the health of school-age Americans. Its findings and opinions are publicized by both of the sponsoring organizations.

As far back as 1918, AMA representatives on the joint committee were influential in declaring health to be the first of seven objectives in education. In 1922 the association declared in favor of periodic health examinations for all persons, including the school-age child. Since 1923, when the AMA began publishing *Hygeia*, now called *Today's Health*, this consumer magazine has been used to focus attention on a wide variety of school health subjects. For many years, as an aid to teachers, the association's Bureau of Health Education prepared discussion questions based on articles in *Today's Health*, which were widely used as classroom material in health education.

Independently and in partnership with the NEA, the American Association for Health, Physical Education, and Recreation, and the American Association of School Administrators, the AMA makes numerous contributions through periodic literature, pamphlets, and monographs dealing with school-age health. It also has been responsible in whole or in part for five major books: "Health Education," "Healthful School Living," "School Health Services," "Health in Schools," and "Fit To Teach."

Since 1926, the association has cooperated with the National Congress of Parents and Teachers in its program for child health, and there always has been an AMA representative on the PTA National Committee on Summer Roundup, recently renamed Child Health.

Maintaining continuous liaison, five traveling representatives of the AMA Bureau of Health Education attend or participate in numerous conferences, workshops, symposiums, panel discussions, and other activities involving school health. With the assistance of the association, an increasing number of medical societies are conducting similar activities at the State and local level through school health committees or other units. Individual physicians are active on boards of education, in school and community health conferences, parent-teacher programs, and cooperative projects with public health officers.

A focal point and clearinghouse for information is the National Conference on Physicians and Schools, held every 2 years under AMA sponsorship. These biennial conferences, which began in 1947, now attract more than 200 representatives of medical societies, health departments, school systems, and national voluntary or Government agencies. Plans are now underway for the Seventh Conference on Physicians and Schools to be held in October 1959.

The association's new Committee on Injury in Sports is developing a comprehensive program to safeguard the health of high school and college athletes. A special Committee on Amphetamines and Athletes is studying the use of such drugs as they relate to athletics. The AMA also is represented on the President's Citizens' Advisory Committee on the Fitness of American Youth.

and wider use of restorative and rehabilitative services.

- Extension of effective methods of financing health care for the aged.
- Expansion of training programs for skilled personnel and improvement of medical and related facilities for older people.
- Amplification of medical and socioeconomic research in problems of the aging.
- Leadership and cooperation in community programs for senior citizens.

It was agreed that the multiple activities necessary to implement this program must be carried out with effective medical leadership, a coordinated approach based on State and local needs, and strong effort to prevent isolation of the aged as a separate group in the human family.

Last November the AMA began distribution of 25,000 copies of "Medicine's Blueprint for the New Era of Aging," a booklet based on the six-point positive program presented at the planning conference. A conference report also has been widely distributed, and a new exhibit, based on the six-point program, has been shown at several National and State meetings of interested groups. The exhibit is being scheduled for numerous future showings.

As the AMA stepped up its own aging program, it also joined last year with the American Hospital Association, American Dental Association, and American Nursing Home Association in forming the Joint Council To Improve Health Care of the Aged. Pooling efforts of the four sponsoring groups, the council will study needs, resources, and programs in the field of aging. A working conference was held last February to plan for the council's first national conference, which attracted approximately 500 participants on June 12-14, 1959, in Washington, D.C. The AMA also is urging medical societies to promote the formation of State joint councils.

Meanwhile, in the area of legislation, the association has taken an active interest in constructive measures related to health care of the aged. Strong support was given to the legislation passed by the 85th Congress calling for a White House Conference on Aging to be held in January 1961, to be preceded by State conferences.

One of the medical profession's major objectives in the field of aging is to extend and improve voluntary health insurance, which already provides coverage for more than 40 percent of the population over 65 years of age. For several years the AMA has been urging experimentation in special types of health insurance coverage for the aged, and since last June it has intensified its liaison efforts with Blue Shield, Blue Cross, insurance companies, and other agencies in the prepayment field.

To expedite the growth of effective voluntary health insurance or prepayment coverage for people over 65 years of age with modest resources or low family income, the AMA House of Delegates in December 1958 adopted a proposal urging all physicians to adjust their charges to a level that will permit the development of insurance and prepayment plans at a reduced premium rate for persons now in that population group.

The association has urged all State and county medical societies to implement that policy. By March 1959 at least eight State societies had taken positive steps, and many more were expected to follow suit at annual or special meetings this spring and fall. The Blue Shield Medical Care Plans, which have a special committee studying all phases of the problem, recently developed a model insurance contract for persons over 65 years of age, incorporating the principle of the AMA policy action. The Health Insurance Association of America is urging all member companies to develop special and continuing coverage for retired persons. In recent months a number of private insurance companies either have announced new policies for the aged or have extended existing policies to more and more States.

Developments in this area are moving at a rapid, accelerating pace. The Health Insurance Association of America estimates that 60 percent of our senior citizens, who want and need it, will have protection by the end of next year. The figure is expected to rise to 75 percent in 1965 and 90 percent by 1970, but actual growth may exceed these conservative estimates.

Meanwhile, the AMA is planning for the future in all aspects of the aging problem. All

The prevalence of tuberculin sensitivity indicates a high infection rate in the lower Yukon area. Comparison with results in two Southern States suggests that tuberculin reactions should be interpreted according to the prevalence of nonspecific sensitivity.

Tuberculin Sensitivity and Tuberculosis Among Natives of the Lower Yukon

GEORGE W. COMSTOCK, M.D., D.P.H., and MERILYS E. PORTER, R.N., M.P.H.

TUBERCULOSIS has been the major health problem of Alaska natives for a long time. Only in the past few years can it be considered to have been brought under control in the sense that facilities for diagnosis, isolation, and treatment of infectious cases are now reasonably adequate.

Aside from the obvious fact that the prevalence of tuberculous infection and disease is extremely high, little is known of the epidemiological aspects of tuberculosis among the native population. Some information regarding tuberculin sensitivity among Alaska natives was obtained during two BCG vaccination programs, one by Aronson in southeastern Alaska in 1938 (1) and the other by the Alaska Department of Health from 1948 to 1951 (2).

Because of the limited information on this subject, it appeared desirable to report the results of a tuberculin survey of the villages along the Yukon River during the spring of 1957.

Both authors are with the Bureau of State Services, Public Health Service. Dr. Comstock is epidemiologist, Tuberculosis Branch, and Miss Porter is chief nurse of the Epidemiology Unit, Arctic Health Research Center, Anchorage, Alaska. (Manuscript received for publication March 10, 1959.)

In addition, the relationship of the size of tuberculin reaction to the prevalence of tuberculosis in this and other populations has important implications for the interpretation of tuberculin sensitivity.

Material and Methods

The original purpose of the tuberculin testing was to obtain baseline data regarding the prevalence of infection prior to the initiation of a controlled trial of isoniazid prophylaxis in the Bethel area of Alaska. This area included the deltas of the Yukon and Kuskokwim Rivers, and is bounded on the west by the Bering Sea, and in the interior by lines from Goodnews Bay and Unalakleet to McGrath (fig. 1). Because the testing teams were available for only a short time before the spring breakup of ice would make travel temporarily impossible, their efforts were concentrated in the villages in the northern half of the area to take advantage of the fact that breakup normally occurs a little later along the Yukon than along the Kuskokwim.

The tests were given and read by three experienced nurses from the tuberculosis program of the Public Health Service, assisted by the

Research

Through its councils on drugs, foods and nutrition, medical physics, mental health and scientific assembly, and committees on research, pesticides, toxicology, and cosmetics, the AMA is continually reporting on research advances in its scientific publications and at its annual and clinical meetings.

In addition to these extensive activities, the association's Committee on Research is engaged in a program of cooperative clinical investigation and collaborative reporting. This approach is being applied to the study of problems in which no one investigator has a large enough series of cases to warrant publication of conclusive findings. The subcommittees on breast and genital cancer, diabetes and pregnancy wastage, and blood dyscrasias are gathering and analyzing case reports in their spheres of interest. A new Subcommittee on Publications is being considered to solicit original articles, abstracts, and reviews dealing with research advances in the basic medical sciences. Through its Committee on Research the AMA has been active in stimulating nationwide interest in the problem of staphylococcal infections in hospitals. The association conducts a grants-in-aid program to supplement existing research projects, making 88 awards which totaled approximately \$30,000 last year.

The AMA right now is studying ways and means of improving and expanding its activities in the entire field of research. The American Medical Research Foundation has been established to initiate and encourage necessary medical research and to correlate and disseminate the results of studies already underway. As soon as legal and financial technicalities are

settled, the foundation will embark on a program which the AMA hopes will be an effective, vital force in the Nation's research effort.

In another action related to research, the association's House of Delegates in December 1958 recommended the creation of a mechanism which will assume the responsibility for promoting active liaison with each national medical society. "In the scientific fields," the house declared, "the role of the AMA should be primarily that of leadership, but every endeavor should be made to bring about coordination of the special fields of scientific interest of the other national medical organizations." Within its own administrative structure, the association also is planning to establish a research department that will concentrate on socioeconomic problems.

Going beyond our national boundaries and demonstrating a sincere interest in the promotion of international health, the American Medical Association is giving full, enthusiastic support to the current legislation which would establish a national advisory council for international medical research and a national institute for international medical research.

Conclusion

The four areas covered in highlight fashion, chronic illness, aging, school health, and research, represent only a fraction of the American Medical Association's total activity aimed toward public and professional service. It is hoped, however, that this report reflects the spirit of progressive, positive action in which the AMA views present and future medical problems.

The prevalence of tuberculin sensitivity indicates a high infection rate in the lower Yukon area. Comparison with results in two Southern States suggests that tuberculin reactions should be interpreted according to the prevalence of nonspecific sensitivity.

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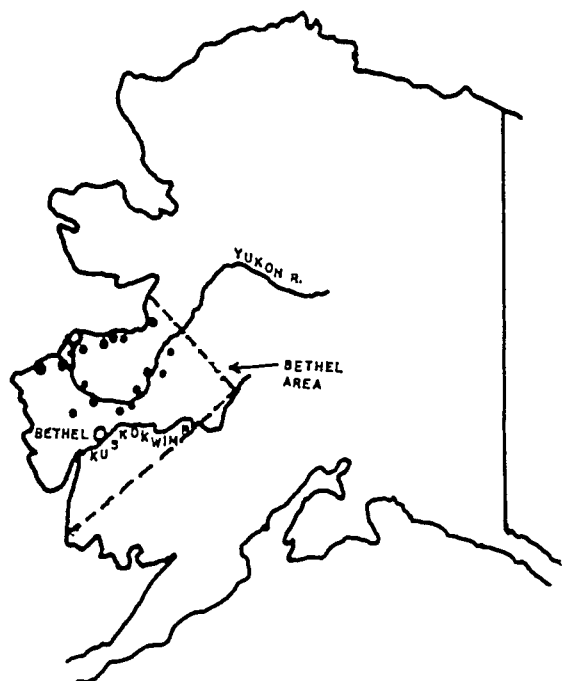
The tests were given and read by three experienced nurses from the tuberculosis program of the Public Health Service, assisted by the

staff of the ambulatory chemotherapy program of the Arctic Health Research Center. All participants were given 5 tuberculin units (T.U.) (0.0001 mg.) of PPD-S. In most instances, the tests were read on the second day; a few readings on the third day have also been included. The transverse diameters of both erythema and induration were carefully measured and recorded to the nearest millimeter.

According to the most recent village rosters, which were brought up to date at the time of the testing, 2,930 persons resided in the 19 villages selected for testing. Tests and readings were completed satisfactorily for 2,285 persons, or 78 percent of the total population, and 91 percent of those at home on the day of the tests (table 1). Many of the remaining 9 percent who did not come in for testing or reading lived far enough from the village centers that they could not come when traveling conditions were poor. The largest group of nonparticipants were those classified as "working or visiting," a large proportion of whom were away on hunting trips. It is likely that many of these persons would have participated if it had been possible to set up a definite schedule in advance of the arrival of the testing teams.

The study population has been restricted to natives of the selected villages with completed tests and identification data. In addition to nonparticipants, 72 whites have been excluded,

Figure 1. Villages participating in the tuberculin testing survey in the Bethel area of Alaska, 1957.



• = PARTICIPATING VILLAGE

as have 2 natives for whom no birth date was available. The study population thus consists of 2,211 persons, 1,777 of whom are classified as Eskimo, 429 Indian, and 5 as mixed Eskimo and Indian. Many of each race have some admixture of white blood.

Table 1. Participation in the tuberculin testing survey among natives of the lower Yukon, 1957

Participation category	Number	Percent
Total population of villages	2,930	100.0
Persons with completed test	2,285	78.0
Persons with no or incompleted test	645	22.0
In village on day of test	225	7.7
Tested, no reading	75	2.6
Sick at home	16	.5
Did not come for test	129	4.4
Known refusals	5	.2
Away on day of test	420	14.3
Hospitalized	112	3.8
In boarding school	52	1.8
Working or visiting	256	8.7

Results

In order to interpret the results of any tuberculin testing survey, it is necessary to consider the problem of nonspecific tuberculin sensitivity, since it is now clear that the true extent of tuberculous infection in a population can be masked by the coexistence of tuberculin sensitivity resulting from infection with other organisms (3). Some evidence on this point was available prior to the survey.

First, atypical acid-fast organisms classified as photochromogens or nonphotochromogens have not been observed in specimens from patients at the Alaska Native Health Service Hospital in Anchorage, even though

scotochromogens were not uncommon. Although this sort of negative evidence is not conclusive, neither can it be entirely ignored, since it is based on work done by Alice Timpe, Alaska Native Health Service, Anchorage, a bacteriologist experienced in the recognition of atypical acid-fast bacilli (4). It does suggest that presently recognized and naturally occurring sources of nonspecific tuberculin sensitivity are probably not highly prevalent in this population.

We expected to find tuberculin sensitivity resulting from BCG vaccination—in some respects the prototype of nonspecific sensitivity—in this population, since BCG vaccination had been done sporadically since 1949 in the Bethel area. It was therefore necessary to identify as accurately as possible the persons in the study population who had been vaccinated and those who had not. This was accomplished by matching, for the tested villages, the tuberculin test records with the vaccination files of the Alaska Department of Health and the ambulatory chemotherapy program of the Arctic Health Research Center.

It is considered that the identification of those who were vaccinated is quite accurate, but a few persons may have been vaccinated without this fact having been recorded, while others may have been vaccinated in villages not included in the testing program. Consequently, some persons classified in this study as unvaccinated may in fact have been vaccinated. We believe that this is not an appreciable source of error except for those under 10 years of age in 1957.

The choice of antigen used for testing is also related to the subject of nonspecific sensitivity, since some antigens detect nonspecific sensitivity better than others. In this survey, the standard antigen given to everyone in the study population was 5 T.U. of PPD-S. In addition, 301 participants were also given an equivalent dose of a PPD prepared from an organism originally classified as a *Nocardia* but later found by others to resemble a *Mycobacterium* (5, 6). The reactions to this antigen, PPD-C, reflect some types of nonspecific sensitivity much better than do those to PPD-S (7). Among the 301 persons tested with both antigens, 243 showed some induration to one

or both preparations. Sixty persons reacted only to PPD-S; four reacted only to PPD-C. Of the 179 reacting to both, only 1 had a significantly larger reaction to PPD-C than to PPD-S. These findings suggest that the kind of nonspecific sensitivity detectable by PPD-C is uncommon in this population.

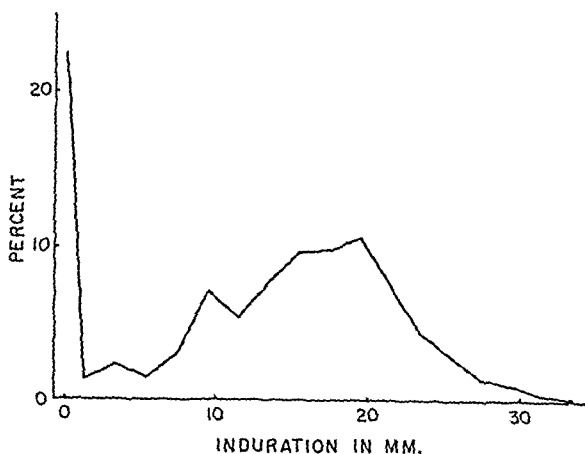
Perhaps the question of whether or not the lower Yukon natives manifest nonspecific sensitivity to the 5-T.U. dose of PPD-S is best answered by the characteristics of the frequency distributions of reaction sizes to this antigen (table 2, fig. 2). The curve of the percentage distribution for the entire study population is bimodal, with 23 percent showing no induration to 5 T.U. of PPD-S. Of those with some induration, there are more persons with very small reactions than with very large reactions. This was noted by each of the three readers and suggests that there is some nonspecific sensitivity in this population, for it seems reasonable to believe that reactions from a single, specific infection would approximate

Table 2. Distribution of sizes of reactions to 5 T.U. PPD-S among natives of the lower Yukon, 1957

Size of induration (mm.)	Total study population	0-14 years		15 years or older	
		Unvaccinated	Vaccinated	Unvaccinated	Vaccinated
Total	2, 211	908	321	953	29
0, E ¹ -----	501	343	129	27	2
1, 2-----	31	16	11	4	0
3, 4-----	51	23	18	9	1
5, 6-----	35	4	5	25	1
7, 8-----	67	22	7	37	1
9, 10-----	159	45	14	97	3
11, 12-----	124	38	9	75	2
13, 14-----	170	53	14	101	2
15, 16-----	217	73	22	117	5
17, 18-----	219	64	16	135	4
19, 20-----	236	90	28	115	3
21, 22-----	165	54	26	80	5
23, 24-----	100	36	7	57	0
25, 26-----	64	20	6	38	0
27, 28-----	33	11	6	16	0
29, 30-----	22	11	0	11	0
31, 32-----	9	2	1	6	0
33, 34-----	3	2	0	1	0
35, 36-----	1	0	0	1	0
37, 38-----	1	0	11	0	0
39, 40-----	2	0	1	1	0
48-----	1	1	0	0	0

¹ E=Erythema only.

Figure 2. Distribution of sizes of reactions to 5 T.U. PPD-S among 2,211 natives of all ages, lower Yukon area, 1957.



a normal curve of distribution, and that excess reactions of any size would very likely have been caused by something else.

It has already been mentioned that some non-specific sensitivity resulting from BCG vaccination might be expected in this population. To investigate this possibility, it is first necessary to establish a baseline, which is provided by the distribution of reaction sizes among persons over the age of 15 years who had no history of vaccination (table 2, fig. 3).

Except for a spur at 9-10 mm. of induration (which appears to be the result of terminal digit preference), the distribution closely approximates a normal one, and is consistent with the notion that the tuberculin test is measuring sensitivity to a single specific infection. Indeed, this distribution, with a mean reaction size of 15.9 mm., is almost the same as those found among patients in tuberculosis hospitals (8). Consequently, we have further reason to believe that there is little, if any, non-specific sensitivity among unvaccinated persons in this area of Alaska which can be detected by the 5-T.U. dose of PPD-S.

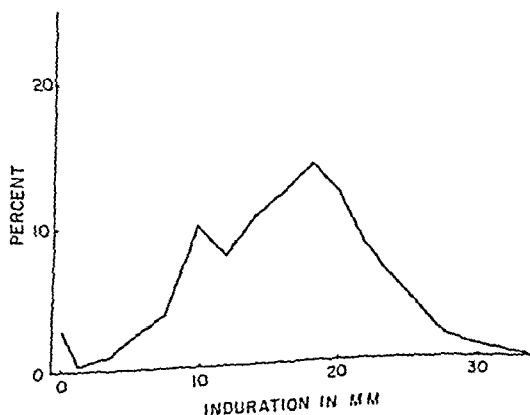
The amount of nonspecific sensitivity resulting from previous BCG vaccination can be estimated from a comparison of the distribution of reaction sizes among vaccinated and unvaccinated persons. Because very few adults had been vaccinated, it is necessary to restrict the comparison to persons under the age of 15 years. Among both groups, the vaccinated and the un-

vaccinated, about 40 percent had no reaction at all to 5 T.U. of PPD-S (table 2, fig. 4). The most apparent difference between the two groups is that 9 percent of the vaccinated had reactions of 1-4 mm. in diameter, whereas only 4 percent of the unvaccinated had reactions of this size. If the comparison is limited to persons with reactions of 5 mm. in diameter or larger, the percentage distributions for the vaccinated and unvaccinated are very similar and do not differ significantly.

Since both distributions are also very similar to that for unvaccinated adults, it seems reasonable to infer that in the lower Yukon area reactions of 5 mm. or larger to the 5-T.U. dose of PPD-S reflect sensitivity resulting from natural infection. For if postvaccinal sensitivity were as strong as that resulting from natural infection, one would not expect to find an excess of very small reactions among the vaccinated without a concomitant excess of larger reactions. The most reasonable explanation of the observed finding is that vaccination in this population resulted in a low level of allergy, and that the spectrum of reactions larger than 5 mm. is probably the result of natural infection which may or may not be superimposed on postvaccinal sensitivity.

That there was in fact a low conversion rate attributable to vaccination is suggested by an examination of the proportion of those with reactions of 5 mm. or more induration among

Figure 3. Distribution of sizes of reactions to 5 T.U. PPD-S among 953 unvaccinated natives, 15 years or older, lower Yukon area, 1957.



the 350 vaccinated persons of all ages. Sixty of these persons had been vaccinated in 1956, or less than 16 months prior to testing (table 3). Only 11, or 18 percent, had reactions of 5 mm. or more in diameter. Although the proportion of reactors increases markedly as the time between vaccination and testing lengthens, this increase is about what would be expected from the natural infection rate in these communities. These findings suggest that either the vaccine used, or the conditions of vaccination, or both, resulted in a very low level of tuberculin sensitivity from vaccination.

Furthermore, aside from the low proportion of small reactions attributable to vaccination, it seems fair to conclude that there is probably no nonspecific sensitivity in this population which can be detected by the 5-T.U. dose of

PPD-S. Consequently, estimates of the prevalence of tuberculous infection will not be very far wrong if they are based on reactions of 5 mm. or more in diameter. Smaller reactions may be either the result of vaccination or the "left hand tail" of the distribution of reactions from specific infection. In some respects this is a most fortunate circumstance, for had BCG vaccination been as effective in causing tuberculin conversions in this population as it has been reported to be in other vaccinated groups, the interpretation of tuberculin sensitivity would have been made much more difficult, and in some respects, impossible.

The prevalence of tuberculous infection in the study population may now be considered, defining a reactor as anyone with 5 mm. or more of induration. Females had slightly

Figure 4. Distribution of sizes of reactions to 5 T.U. PPD-S among 908 unvaccinated and 321 vaccinated natives under 15 years, lower Yukon area, 1957.

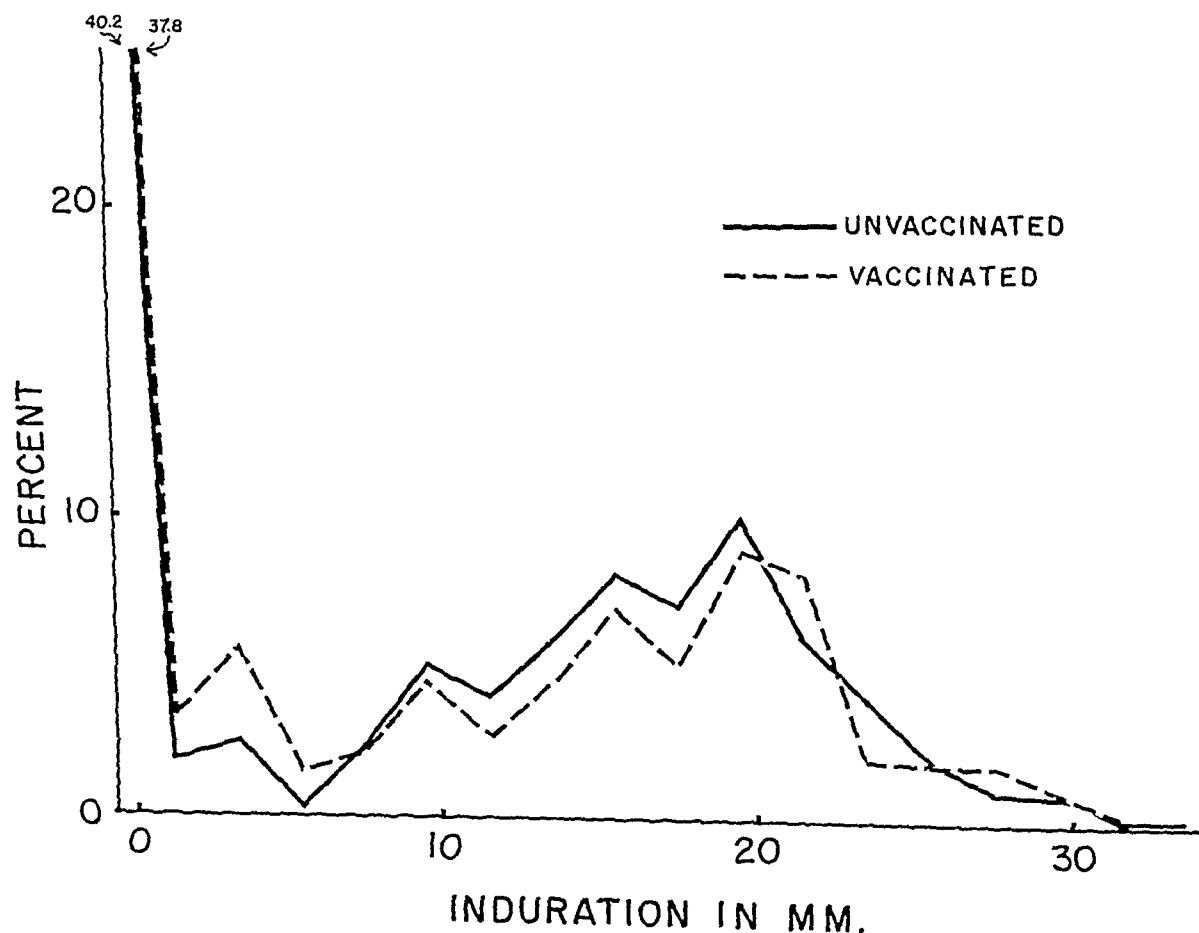


Table 3. Vaccinated natives with reactions of 5 mm. or more induration to 5 T.U. PPD-S, lower Yukon area, 1957, by year of vaccination

Year of vaccination	Total vaccinated persons	Persons with 5 mm. or more induration in 1957	
		Number	Percent
Total.....	350	189	54.0
1956.....	60	11	18.3
1955.....	24	6	25.0
1952.....	102	52	51.0
1951.....	17	10	58.8
1949.....	140	107	76.4
Other ¹	7	3	-----

¹ Includes 4 with vaccination year not stated; 1 each vaccinated in 1950, 1953, and 1954.

larger tuberculin reactions on the average than males. There were no significant differences between Eskimos and Indians, a finding in apparent disagreement with that reported by Weiss (2), who found somewhat lower reactor rates among interior Indians than among Eskimos of the Yukon and Kuskokwim deltas. However, his populations were drawn from a larger area than that of this study.

There were tremendous differences in tuberculin sensitivity with age (table 4, fig. 5). The prevalence of reactors was 22 percent in the age group 0-4 years, and it increased rapidly

up to the age group 15-19 years, which had a prevalence of 96 percent. This high level was maintained to 65 years, with a moderate decrease among older persons. Among persons with a history of vaccination, except in the youngest age group where the prevalence among the vaccinated was slightly but not significantly higher, the prevalence of positive reactions was generally lower than among persons classified as unvaccinated. At first glance, this seems to be a disturbing finding. But when it is recalled that the vaccinated had been previously selected as negative reactors, that vaccination appears to have caused relatively little sensitivity, and that the subjects were presumably exposed thereafter to a very high natural infection rate, the differences between the vaccinated and the unvaccinated in this respect appear more reasonable.

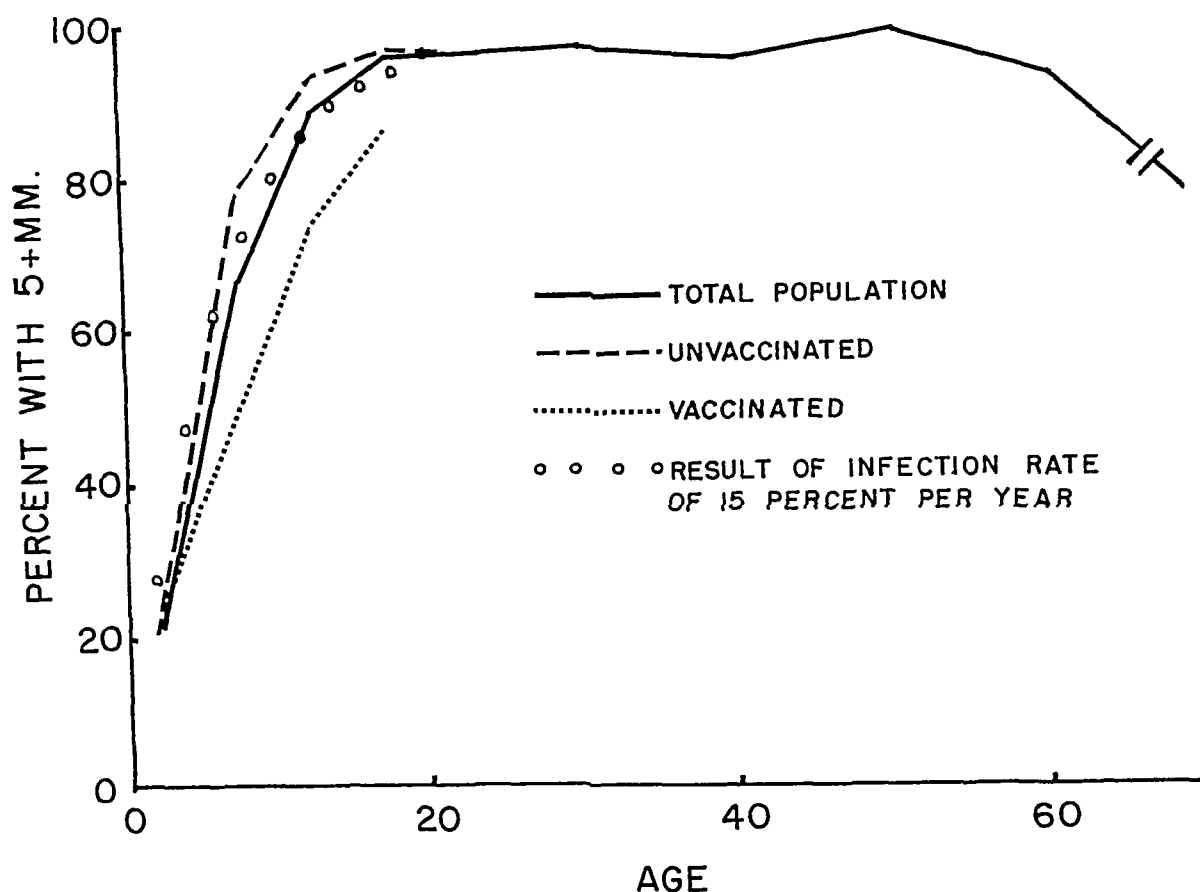
Because of vaccination, even though its effects were not great, it is impossible to ascertain with certainty the infection rate that has prevailed among this population in recent years. However, it can be shown that a prevalence ratio of 96 percent at age 20 can only be achieved by an average infection rate of 15 percent per year. The prevalence resulting from this theoretical rate is indicated by open circles in figure 5. Vaccination cannot affect this average rate since practically no one older than 20 years had been vaccinated.

The average infection rate experienced by

Table 4. Natives with reactions of 5 mm. or more to 5 T.U. PPD-S, by age and vaccination status, lower Yukon area, 1957

Age in 1957 (years)	Total			Unvaccinated			Vaccinated		
	Persons tested	5 mm. or more		Persons tested	5 mm. or more		Persons tested	5 mm. or more	
		Number	Percent		Number	Percent		Number	Percent
Total.....	2,211	1,628	73.6	1,861	1,439	77.3	350	189	54.0
0-4.....	460	99	21.5	389	81	20.8	71	18	25.4
5-9.....	436	293	67.2	265	207	78.1	171	86	50.3
10-14.....	333	297	89.2	254	238	93.7	79	59	74.7
15-19.....	220	211	95.9	197	191	97.0	23	20	87.0
20-24.....	160	154	96.2	158	152	96.2	2	2	-----
25-34.....	227	221	97.4	227	221	97.4	0	0	-----
35-44.....	167	160	95.8	166	159	95.8	1	1	-----
45-54.....	103	102	99.0	103	102	99.0	0	0	-----
55-64.....	60	56	93.3	58	54	93.1	2	2	-----
65 or over.....	45	35	77.8	44	34	77.3	1	1	-----

Figure 5. Natives with reactions of 5 mm. or more to 5 T.U. PPD-S, by age and vaccination status, lower Yukon area, 1957.



younger persons is more problematical. If one accepts that vaccination in this particular instance did not appreciably affect the proportion of persons with reactions of 5 mm. or more in diameter, it would be reasonable to utilize the experience of the total group as reflecting the prevalence of tuberculous infection at various ages.

In any event, since an average annual infection rate of 15 percent would produce the observed prevalence at age 20, and since the points on the observed curves fall progressively below the theoretical ratio as age decreases below 20 years, it seems likely that the infection rate 20 years ago was appreciably higher than 15 percent, and that more recently it has fallen to a much lower level, possibly in the neighborhood of 5 percent per year. This is still a much greater infection rate than that reported for the United States as a whole, which has been esti-

mated to be about 0.1 percent per year at the present time (9).

The definition of a positive reactor accepted in the preceding sections was an arbitrary one, based partly on the fact that the 5-mm. level of reaction excluded the most noticeable effects of vaccination, and partly on common usage. However, for some time the wisdom of using the same definition of a positive reactor in all areas has been questioned. In areas where non-specific sensitivity is very common, defining positive reactors as those persons with 5 mm. or more of induration to the 5-T.U. dose may classify so many persons with false positive (nonspecific) reactions among the positive group that the separation of true positives from true negatives is very unsatisfactory. On the other hand, in areas where there is little or no nonspecific sensitivity, the same definition of positive reactors may yield a relatively pure

group of truly infected persons, but the group classified as negative may also include a number of infected persons. Some evidence that this does, in fact, occur may be gathered from comparing the frequency of tuberculous disease among persons with different sizes of tuberculin reactions in two geographic areas.

The experience of Muscogee County, Ga., and Russell County, Ala., where there appears to be a great deal of nonspecific sensitivity to the 5-T.U. dose may be contrasted with that of the lower Yukon area where there appears to be very little. In the spring of 1950 a tuberculin testing and chest X-ray survey was conducted in Muscogee and Russell Counties, in which the participants received 5 T.U. of PPD (RT XIX-XXI, supplied by the State Serum Institute, Copenhagen, Denmark).

All persons classified as having suspected or definite tuberculosis on the basis of the survey followup examination had their records and films reviewed after 6 years of observation. The followup examinations were quite extensive for most of them, but for a few they consisted only of a single, large chest film. On the basis of the available evidence—extensive or scanty—but without consideration of the

tuberculin sensitivity of the subjects at the time of the survey, a decision was made as to whether or not the findings appeared to have warranted classifying persons as tuberculous or suspected of having tuberculosis. Persons so classified on the basis of this retrospective review are counted as cases in the present analysis.

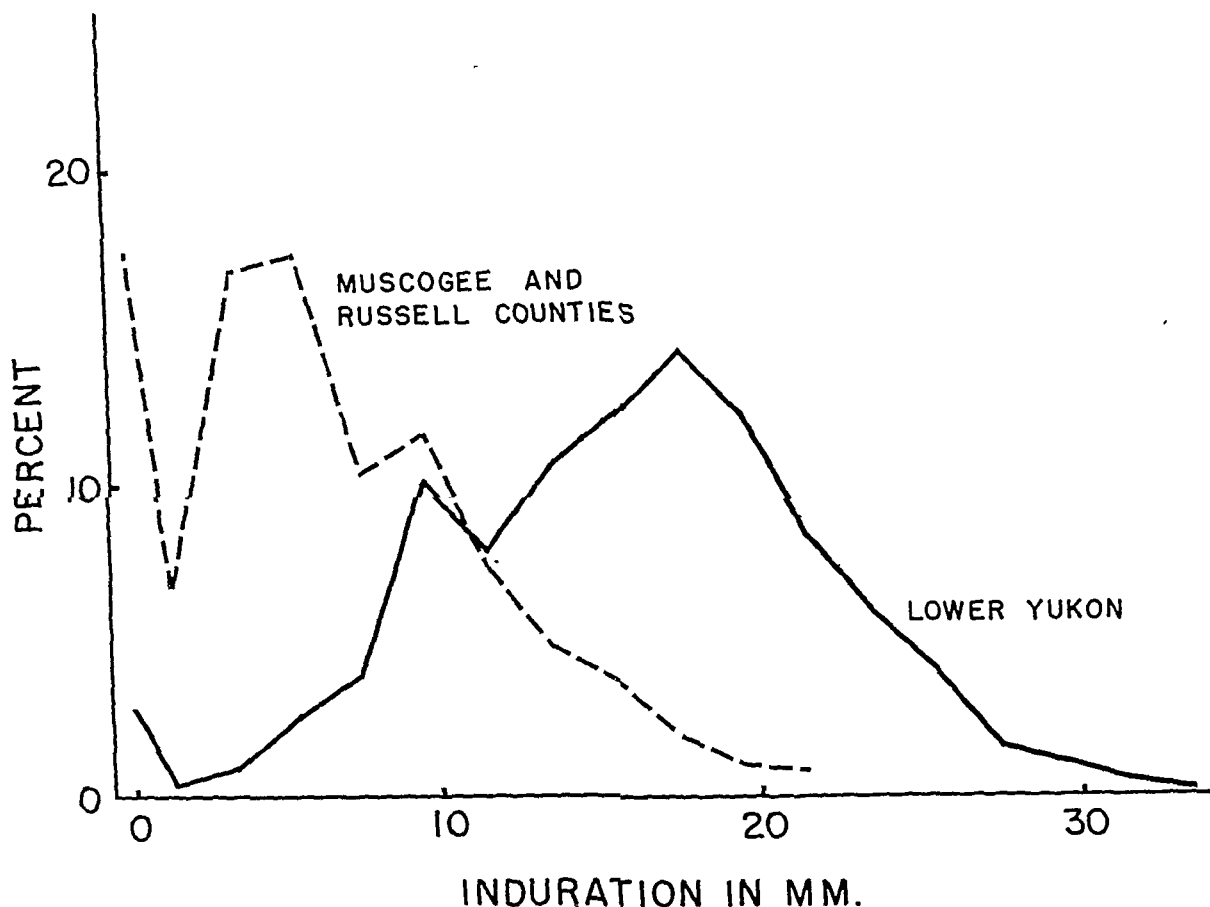
For the participants in the tuberculin testing survey along the lower Yukon, the records from the X-ray survey of the villages during the preceding year were matched against the tuberculin test cards. For those who had been tested and X-rayed, the diagnosis made by the Alaska Department of Health was utilized to define a case, accepting as such all those classified as having suspected or definite reinfection-type tuberculosis. As in the Muscogee-Russell area, this diagnosis in some instances was based on a single film; in others, it was substantiated by a long period of followup examinations, including bacteriological and clinical studies. The clinical diagnosis was independent of the tuberculin findings of the survey.

In both areas, the great majority of cases appeared to be inactive at the time of the X-ray survey. However, 24 percent of the cases in the lower Yukon area and 18 percent

Table 5. Distribution of sizes of reactions to 5 T.U. PPD among unvaccinated persons over 15 years of age in two geographic areas

Size of induration (mm.)	Lower Yukon natives, 1957		Residents of Muscogee and Russell Counties, 1950		Percent of persons with 1 mm or more induration	
	Number	Percent	Number	Percent	Lower Yukon	Muscogee and Russell
Total	953	100 0	47, 236	100 0	100 0	100 0
0, E	27	2 8	8, 227	17 4	4	8 0
1, 2	4	. 4	3, 118	6 6	1 0	20 3
3, 4	9	. 9	7, 912	16 7	2 7	21 0
5, 6	25	2 6	8, 176	17 3	1 0	12 5
7, 8	37	3 9	4, 867	10 3	10 5	11 1
9, 10	97	10 2	5, 499	11 6	8 1	9 0
11, 12	75	7 9	3, 505	7 4	10 9	6 0
13, 14	101	10 6	2, 336	4 9	12 6	1 5
15, 16	117	12 3	1, 769	3 7	11 6	2 4
17, 18	135	14 2	927	2 0	12 4	1 3
19, 20	115	12 1	514	1 1	22 8	1 0
21 or more	211	22 1	386	8		
0-4	40	4 2	19, 257	40 8	1 4	28 3
5-10	159	16 7	18, 542	39 2	17 2	17 5
11 or more	754	79 1	9, 437	20 0	81 4	21 2

Figure 6. Comparison of distributions of sizes of reactions to 5 T.U. PPD among unvaccinated persons 15 years or older in two geographic areas.



of those in the Muscogee-Russell area have had positive bacteriological findings at some time.

There is a marked difference between the two populations in the distribution of reaction sizes to 5 T.U. of PPD in unvaccinated persons over 15 years of age (table 5, fig. 6). Half of the reactions in the Muscogee-Russell area are smaller than 7 mm.; in contrast, half of the reactions in the lower Yukon area are larger than 16 mm. On the basis of unpublished studies in Muscogee and Russell Counties and studies by Nissen Meyer (10), only a small part of this difference can be attributed to differences in the antigens used in the two areas.

Before examining the relationship of tuberculous disease to the size of tuberculin reaction, one more difficulty must be considered. It is well known that there are definite reader differ-

ences which may enter into the problem of interpreting tuberculin sensitivity. Although several different readers participated in the Muscogee-Russell survey, it was possible to have each reader measure reactions from all major segments of the population. In the lower Yukon area, this could not be done. One reader, for instance, worked in the villages near the mouth of the Yukon; the other two farther up the river and in Unalakleet. The readings by the first reader formed a distribution about 3 mm. smaller on the average than the readings of the other two nurses. This difference appeared to have been a personal one—it did not appear to be associated with village, race, sex, age, or vaccination status—and is consistent with differences noted in the readings of these three nurses on other series of comparative readings.

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0, E..	27	2 8	8,227	17 4	1	8 0
1, 2..	4	4	3,118	6 6	1 0	20 3
3, 4..	9	9	7,912	16 7	2 7	21 0
5, 6..	25	2 6	8,176	17 3	4 0	12 5
7, 8..	37	3 9	4,867	10 3	10 5	14 1
9, 10..	97	10 2	5,499	11 6	8 1	9 0
11, 12..	75	7 9	3,505	7 4	10 9	6 0
13, 14..	101	10 6	2,336	4 9	12 6	4 5
15, 16..	117	12 3	1,769	3 7	11 6	2 4
17, 18..	135	14 2	927	2 0	12 4	1 3
19, 20..	115	12 1	514	1 1	22 8	1 0
21 or more	211	22 1	386	8		
0-4	40	4 2	10,257	40 8	1 1	28 3
5-10	159	16 7	18,542	39 2	17 2	17 5
11 or more	754	79 1	9,437	20 0	81 1	21 2

was very different in the two areas, being nearly 30 percent in the lower Yukon area and only 1.2 percent in Muscogee and Russell Counties (table 6, fig. 7). In the lower Yukon area, there was no significant difference in the frequency of tuberculosis among persons with different sizes of tuberculin reactions, whereas in Muscogee and Russell Counties, there was a marked and progressive increase in the frequency of tuberculosis with increasing size of the tuberculin reaction. The same relationships were noted when the cases were restricted to bacteriologically confirmed cases from the two areas.

Previous reports have noted that there is a positive correlation between size of tuberculin reaction and subsequent incidence of tuberculosis, similar to that noted for prevalence of tuberculosis in the Muscogee-Russell area (11-14). For such a relationship, there could be at least two explanations. One is based on the notion that allergy to tuberculo-protein is harmful to the host, and that demonstrable disease is therefore more likely to be present among those with the highest levels of allergy. The second is that among persons with small reactions, there are many in some areas who are not infected with tubercle bacilli but with something else much less pathogenic, while persons with large reactions have almost all been infected with tubercle bacilli.

Either hypothesis is consistent with the findings from Muscogee and Russell Counties, and with the reports on incidence of tuberculosis according to the size of tuberculin reactions. However, the first hypothesis does not fit with the findings from the lower Yukon area; the second is entirely consistent. These findings therefore indicate that the degree of allergy per se does not appear to be related to the likelihood of having tuberculous disease, and provide additional support for the concept of non-specific sensitivity (15-17).

Discussion

Those who are unfamiliar with the tuberculosis situation among Alaska natives may have difficulty in accepting that almost 30 percent of the adults in these 19 villages had X-ray findings compatible with past or present tu-

berculosis. However, there is evidence that this extraordinary prevalence of tuberculosis is not exaggerated. Historical records suggest that the arrival of the white man in Alaska was closely followed by the appearance of tuberculosis among the natives (18). This soon assumed the characteristics of an epidemic, which only in recent years has appeared to be subsiding. Prior to 1952, the recorded tuberculosis mortality for Alaska natives was well in excess of 500 per 100,000 (19,20); for the years 1953-56, the average annual death rate for the Bethel area was 282, according to unpublished data from the Arctic Health Research Center. Also consistent with the epidemic character of tuberculosis in this population is the prevalence of tuberculin sensitivity, which is as high, if not higher, than any recorded in recent years. In the International Tuberculosis Campaign, only a few cities in Poland, Yugoslavia, and North Africa had reactor rates approaching those among natives of the lower Yukon (21).

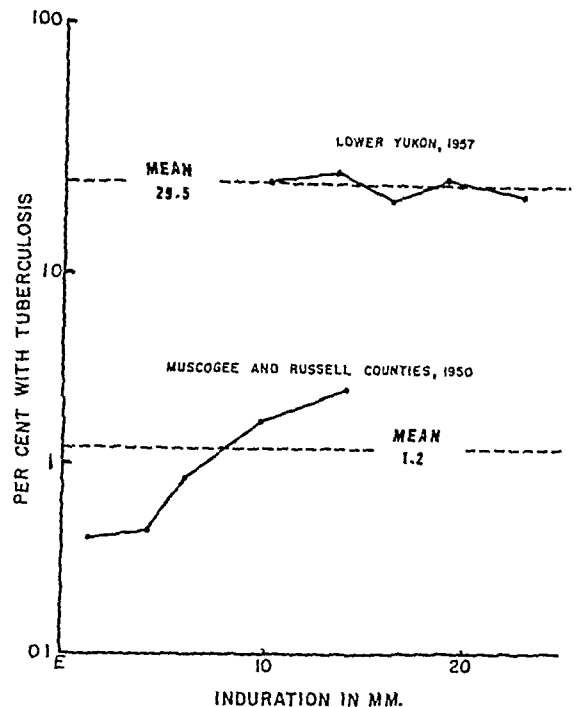
In an area where tuberculosis is so common, it might be suspected that most pulmonary abnormalities would be classified as tuberculous. However, an independent reading of several hundred films from the Bethel area by Comstock yielded prevalence rates essentially the same as those derived from film readings by the Alaska Department of Health. In addition, similar findings have been noted in the Eskimo population of Greenland. Helms (22) reported that 41 percent of the adults in Angmagssalik during the period 1948-51 showed some X-ray evidence of pulmonary tuberculosis; and in 1956, Stein and Groth-Petersen (23), in a very thorough survey of the native Greenlanders, found that 29 percent of those over 15 years of age showed lung changes of a tuberculous character. On the basis of the available evidence, it is our opinion that the reported prevalence of tuberculous lesions in the present study population is entirely reasonable.

Confidence in the lack of an association between the size of the tuberculin reaction and X-ray evidence of reinfection-type tuberculosis in this study population is strengthened by the fact that the same relationship was observed when the cases were restricted to persons with a history of positive bacteriological findings.

Such reader differences would not have been of critical importance except that the prevalence of tuberculosis was appreciably higher in the villages near the mouth of the Yukon, those tested by the first reader, than among the villages tested by the other two. Such a situation obviously tends to produce a "built-in" correlation between smaller reactions and increased prevalence of tuberculosis. However, when each reader's subjects were studied separately, the relationships between reaction size and frequency of tuberculosis were similar for each of the three groups.

It therefore appeared reasonable to combine the results for all three readers, but only if this could be done in such a way that the "built-in" correlation could be avoided. First, to eliminate the possible effects of vaccination, the subjects in both areas were restricted to unvaccinated persons over the age of 15 years. Then, for each reader in the lower Yukon survey, the subjects who showed some reaction (erythema or any induration) to the 5-T.U. dose were ranked by size of reaction, and each of the three groups was divided into fifths or quintiles. The quintiles from each reader's subjects with the smallest reactions were combined to form the first quintile of the total group, those with the next larger reactions were combined to form the second quintile, and so on. The subjects from the Muscogee-Russell area with some reaction to 5 T.U. of PPD were also divided into quintiles. In both areas, the populations were divided in such a way that each quintile would

Figure 7. Prevalence of reinfection-type pulmonary tuberculosis among unvaccinated reactors 15 years of age or older in two geographic areas, by size of reaction to 5 T.U. PPD.



contain a whole number of persons; the cases were allocated on a proportionate basis which resulted in fractional numbers of cases being assigned to each quintile.

The total prevalence of tuberculosis among adults with some reaction to the 5-T.U. dose

Table 6. Prevalence of reinfection-type pulmonary tuberculosis among unvaccinated reactors,¹ 15 years of age or older in two geographic areas, by size of reaction to 5 T.U. PPD

Quintile	Lower Yukon				Muscogee and Russell Counties			
	Midpoint of interval	Number of persons	Persons with tuberculosis		Midpoint of interval	Number of persons	Persons with tuberculosis	
			Number	Percent			Number	Percent
Total	16.1	692	204.0	29.5	6.2	41,893	496.0	1.18
1st	9.8	138	42.4	30.7	1.3	8,378	31.2	.41
2d	13.3	138	47.1	34.1	4.1	8,379	37.7	.45
3d	16.1	140	34.2	24.4	6.2	8,379	71.5	.85
4th	18.9	138	43.5	31.5	9.3	8,379	141.8	1.69
5th	22.8	138	36.8	26.7	14.0	8,378	210.8	2.52

¹ Defined as all persons with some erythema or induration to the 5-T.U. dose of PPD.

tions increased markedly with age, reaching a level of 96 percent in the age group 15 to 19 years. This represents an average infection rate of 15 percent per year. It appears that the infection rate was even higher 20 years ago, and appreciably lower in recent years.

Among unvaccinated adult reactors to the 5-T.U. dose, the prevalence of active and inactive reinfection-type tuberculosis was almost 30 percent, and was essentially the same among persons with small and large tuberculin reactions. In contrast, in Muscogee County, Ga., and Russell County, Ala., where there is a great deal of nonspecific sensitivity, the prevalence among unvaccinated adult reactors was 1.2 percent, and was much higher among persons with large reactions than among those with small reactions. This finding is interpreted to signify that the prevalence of tuberculosis does not vary with the degree of allergy from specific infection, and as being consistent with the concept that there is considerable nonspecific tuberculin sensitivity in the Muscogee-Russell area and little if any in the lower Yukon area.

The problem of defining a positive tuberculin reactor is discussed, and it is suggested that the definition selected should vary according to the prevalence of nonspecific sensitivity in the area under consideration.

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In addition, a similar relationship was also noted for pulmonary calcifications which, with the virtual absence of histoplasmin sensitivity in this population (24), are likely to represent the residuals of healed primary tuberculosis.

The comparison between the findings in the lower Yukon area and those in two counties in the southeastern United States clearly illustrate the difficulties imposed on the interpretation of tuberculin sensitivity when this is attempted on the basis of a single standard for negative and positive reactions regardless of the prevalence of nonspecific sensitivity. In populations similar to the unvaccinated adult natives of the lower Yukon area, if the findings of this study can be confirmed by further investigation, it may be that any reaction to 5 T.U. of PPD-S can be considered as positive for tuberculous infection.

On the other hand, in areas like Muscogee and Russell Counties, where nonspecific sensitivity is very common, a simple dichotomy of reactions into negative and positive can never be entirely satisfactory. If the dividing line is placed fairly low on the scale of tuberculin sensitivity, say between 4 and 5 mm. of induration to the 5-T.U. dose, the negative group will contain relatively few persons infected with tubercle bacilli, but those classified as positive will include many who are infected with something else. Shifting the dividing line to 15 mm. would probably reduce the false positives to a negligible proportion, but would result in classifying many persons infected with tubercle bacilli among the negatives.

For those areas where nonspecific sensitivity is commonly encountered, a further subdivision into more categories than the two of negative and positive in common usage should be seriously considered. At the very least, it would seem wise to interpose an additional category of "doubtful" for those persons with intermediate-sized reactions of 6 to 10 mm. to the 5-T.U. dose. With such a classification, the negative reactions of 0 to 5 mm. would very largely signify the absence of tuberculous infection, and the positive reactions of 11 mm. or more of induration would very largely signify that tuberculous infection had occurred. Reactions of 6 to 10 mm. would quite properly be labeled doubtful, since in areas with more than

one cause for tuberculin sensitivity, testing with the 5-T.U. dose of PPD-S alone cannot differentiate specific reactions of this size from non-specific reactions.

The present study is only a small contribution to a long series initiated by Palmer and his associates to apply the concepts of the normal distribution of attributes in biological populations to the problem of tuberculin sensitivity in humans from many geographic areas (15-17, 25). By using standardized antigens and careful techniques of measurement, it has been possible to show that the varied patterns of sensitivity elicited in different populations can only be explained satisfactorily by the existence of tuberculin sensitivity caused by something other than the tubercle bacillus. Although this concept has shattered the apparent simplicity of the tuberculin test as a casefinding and diagnostic tool, its application to the practical uses of tuberculin testing will result in the resolution of some of the former enigmas of tuberculin sensitivity and in a more accurate subdivision of tested populations into those who are truly infected with tubercle bacilli and those who are not.

The ability to make this subdivision with as much discrimination as possible is becoming progressively more important. For as tuberculosis declines in many areas to the point where it may be controlled, the seedbed of disease will more and more come to be those who have been infected in the distant past. These must be identified as accurately as possible if maximum progress is to be maintained toward the eradication of tuberculosis.

Summary

In 1957, tuberculin tests were given to 2,211 natives living in 19 villages along or near the lower Yukon River in Alaska. The test antigen was 5 T.U. of PPD-S, and all reactions were carefully measured by experienced nurse readers. Consideration of the distributions of reaction sizes suggests that there is little nonspecific tuberculin sensitivity detectable by this dose of tuberculin in this native population, except for some sensitivity attributable to BCG vaccination.

The prevalence of positive tuberculin reac-

*Excerpts from a discussion of facts, fancy, and corruption
in the interpretation of science to the public.*

Quackery and the News

WALLACE F. JANSSEN

IN the past half century, there has been a profound change in the attitude of the press, and the lay public, concerning the news of science. Editors were inclined at one time to regard the scientist as a long-haired character, a sort of modern Merlin muttering mathematical incantations over his test tubes. Today the scientist is a respected source of important news. With this has come a tremendous increase in the amount of information about science which is reaching the public.

A study on "Science, the News, and the Public," made for the National Association of Science Writers, revealed that Americans get their science news primarily from newspapers, with television and magazines ranking close together as the next most popular sources.

In 10 major categories, medical news was third in reader popularity, outranking even such topics as sports, comics, and crime. Thirty-seven percent of the newspaper readers reported that they read all the health news they can find, as compared with 28 percent who read the nonmedical science news.

Not only has there been a great increase in

the volume of medical news but it seems entirely likely that this situation will continue.

Is this good? Or is it a Frankenstein monster that we must tame, control, or learn to live with?

Certainly the dissemination of knowledge is good. Undeniably, however, lay press reporting of news on health and medicine has had some undesirable characteristics and side effects as well as good effects.

The years since World War II have seen unprecedented progress in the development of new drugs. Antibiotics, for example, have revolutionized the treatment of infectious diseases and all but wiped out some of them. But we have seen how the publicizing of these miracle drugs has in some instances led to excessive and indiscriminate use with harmful consequences. Patients and their relatives beg physicians to use this or that product. Fads and fashions in the use of newly popular preparations are familiar to the medical profession.

A standard pattern has been observed in the life history of highly publicized drugs. First is the period of "great expectations." Often this begins before the drug is on the market. Stories appear reporting that some researcher has hit on a promising new compound that may be of value in treating some more or less common affliction. For many writers these are bread-and-butter pieces—a standard item of journalistic merchandise. A series may be published on developments in a research program. Finally the great day comes when the

Mr. Janssen, director, Division of Public Information, Food and Drug Administration, U.S. Department of Health, Education, and Welfare, delivered the Williams Memorial Lecture in the 24th annual series, "Lectures to the Laity," at the New York Academy of Medicine, November 1958. Full text of the series, entitled "Science, Man's Master or Servant," will be published by the academy.

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- (22) Helms, P.: Investigations into tuberculosis at Angmagssalik. Copenhagen, Bianco Lunos Bogtrykkeri A/S, 1957.
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- (24) Comstock, G. W.: Histoplasmin sensitivity in Alaska natives. *Am. Rev. Tuberc.* 79: 542, April 1959.
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Radioactivity Levels in Milk Samples

The levels of radioactivity in milk collected during February 1959 from 10 sampling stations across the country remained below the levels currently suggested as permissible by the National Committee on Radiation Protection and Measurements.

The milk sampling network of stations is part of the program of the Public Health Service for measurement of radioactivity in air, water, and food. In reporting on radioactivity levels in milk, the Service will continue to make comparisons with the permissible levels of the national committee.

The only levels thus far developed for radiation exposure for the general population are those recommended by that committee and the International Commission on Radiological Protection. Both bodies recognize that the general population should be considered separately from industrial workers

exposed to radioactivity. The national committee has recently revised its 1953 recommendations for industrial workers, but left those for the general population unchanged. The international commission has made recommendations regarding radiation exposure for the general population which are being studied by the national committee.

The national committee, in a statement of April 23, 1959, considers "that undue risks to the population will not be incurred by following current policies for a while longer, during which time it is hoped that methods may be established for a meaningful analysis and control of population exposure."

Both the monthly levels and the yearly averages for all radioactivity in milk samples remained below permissible levels suggested by the national committee.

Yearly average levels ¹ of radioactivity in milk samples, period ending February 1959

Area	Calcium ²	Iodine-131 (3,000)	Strontium-89 (7,000)	Strontium-90 (80.0)	Barium-140 (200,000)	Cesium-137 (150,000)
Cincinnati, Ohio	1.142	33	69	9.8	24	64
New York, N.Y.	1.094	28	37	6.7	15	62
Sacramento, Calif.	1.133	31	25	5.0	6	57
Salt Lake City, Utah	1.147	28	22	4.5	8	46
St. Louis, Mo.	1.266	83	140	15.1	48	86

¹ Expressed in curies (a curie is a measure of radioactivity equivalent to that produced by 1 gram of radium). (1 millicurie is 1 millionth of a curie).

² In grams per liter.

NOTE: The figures in parentheses are the maximum permissible limits for lifetime exposure of population groups to the specific radioisotopes in water, derived from the current recommendations of the National Committee on Radiation Protection and Measurements.

10,000 patients taking his treatment, a statement the Food and Drug Administration did not think exaggerated.

Mr. Hoxsey called his medicine "chemotherapy." It cost \$400 plus \$60 of incidental expenses. The American Medical Association called it a cough sirup. It might also be called a mild laxative, since it contains cascara sagrada along with such other ingredients as prickly ash bark, burdock, poke root, and extract of red clover blossoms.

The promotion of the Hoxsey treatment is a classic illustration of how unfortunate people may be misinformed regarding a life-or-death problem—the treatment of cancer. It is the more significant in view of its success at a time when millions of dollars and the best efforts of health educators were being devoted to providing correct and reliable information on the treatment of cancer, and to urge early treatment.

A variety of methods were used and to some extent are still being used to promote the Hoxsey treatment. One of these was the purchase of editorial space in nationally circulated magazines. The late Rev. Gerald K. Winrod, of Wichita, Kans., was paid \$82,000 for promoting the treatment in his *Defender* magazine. This circulated mainly to Protestant fundamentalist groups in rural sections and small towns. A newsstand publication called *Man's Magazine* was paid for printing illustrated articles composed largely of testimonials. These were the same ones which Hoxsey has been using for years and which were investigated by the Food and Drug Administration and exposed in open court. Millions of reprints of these articles were used by Hoxsey for promotion purposes. The *National Christian Crusader*, published by Rev. Dr. Merle E. Parker of Santa Ysabel, Calif., devoted its columns to attacking the Food and Drug Administration and the medical trust, and boosting the Hoxsey treatment. Circulation of the *Crusader* was reported to exceed 1 million copies. These were not all of the periodicals which promoted the Hoxsey cure in their editorial columns.

Most of the pro-Hoxsey publicity was obtained after the issuance of the first injunction against the treatment in 1952. The publishers cooperated notwithstanding a decision of the

U.S. Court of Appeals holding that the medicine had been proved worthless for the treatment of cancer. Some of the articles, in fact, reported the Government's efforts to stop the sale of the medicine and described it as "controversial," a word which to some editors and broadcasters seems to justify copy they would not otherwise tolerate.

Is it possible, when a medical myth has been widely disseminated, to mount a successful counterattack? Many are skeptical about this, including some public health authorities. They have the idea that any publicity about a worthless remedy will only serve to advertise it.

In April 1956, when it was clear that litigation to stop distribution of the Hoxsey treatment might be prolonged for years, a nationwide public warning was issued under authority of section 705 of the Federal Food, Drug, and Cosmetic Act. It was widely published by the press, and although some papers devoted as much space to printing Mr. Hoxsey's protests and denunciations as they did to the Government's warning, the warning was effective. There was an immediate and drastic reduction in patronage of the clinics, both at Dallas, Tex., and Portage, Pa. By a conservative estimate, in the first 30 weeks after the warning was issued, at least 3,000 people had been dissuaded from being taken in by the false promise of a quick and painless cure, without recourse to methods that could really have helped them.

Especially effective was a condensed version of the warning sent to farm, lodge, and church periodicals. These reached older people and residents of rural areas, groups most exposed to the Hoxsey publicity. Some editors of these papers received numerous abusive letters from pro-Hoxsey readers. Not one of these editors retracted what they published. Several of them commented to us that the need for information was indeed serious, in view of the number of people who apparently believed in the treatment.

As any editor can tell you, a correction of a story will not reach exactly the same people who read the original incorrect story. Similarly, more publicity is needed to offset a medical lie than to spread it in the first instance. In January 1957, the public warning was reissued,

The Health of Science

In certain areas of science, where empirical data are still hazy, a point of view may acquire a kind of cult following and harden into rigid dogma. Modifications of Einstein's theory, for example, sometimes meet a resistance similar to that which met the original theory. And no doubt the reader will have at least one acquaintance for whom a particular brand of psychoanalysis has become virtually a religion, and who waxes highly indignant if its postulates are questioned by adherents of a rival brand.

Actually, a certain degree of dogma—of pig-headed orthodoxy—is both necessary and desirable for the health of science. It forces the scientist with a novel view to mass considerable evidence before his theory can be seriously entertained. If this sit-

uation did not exist, science would be reduced to shambles by having to examine every new-fangled notion that came along. Clearly, working scientists have more important tasks. If someone announces that the moon is made of green cheese, the professional astronomer cannot be expected to climb down from his telescope and write a detailed refutation. "A fairly complete textbook of physics would be only part of the answer to Velikovsky," writes Prof. Laurence J. Lafleur, in his excellent article on "Cranks and Scientists" (*Scientific Monthly*, November 1951), "and it is therefore not surprising that the scientist does not find the undertaking worthwhile."—*Excerpt from "Fads & Fallacies in the Name of Science" by Martin Gardner.*

new product goes on the market. But this does not end the process of publicity. Other newsworthy developments occur and are reported, including sometimes the discovery of unforeseen and unfortunate adverse reactions. This results in a second standard type of story, warning about the consequences that may result from improper use of a well-known and highly touted preparation.

Up to this point we have been talking about the interpretation of science via the major channels of public information, the wire services, newspapers, magazines, radio, and television. Much of their medical and health news comes from professional sources, research workers, clinicians, and the public relations people associated with the sponsoring organizations.

An increasing proportion of such news is being reported by science writers, men and women who are specializing in this field of reporting. They have an association, the National Association of Science Writers, now 25 years old.

There is no very precise definition of a science writer, but one distinction is that a growing number observe the practice of checking stories with their sources. To many general news reporters this is anathema, censorship, but the

science writer finds that it often helps to improve his story as well as to insure the confidence of his sources. There has been a marked improvement in the quality of science reporting, and this trend continues.

But there are other sources and channels of information on health, medicine, and science. And there are many who interpret science to the public. We need to be at least as much concerned about the misinterpretation of science to the public as we are about its interpretation. Pseudoscience and quackery, as well as legitimate news of science, find their way into the media of communication.

Of course, quackery is nothing new. Surprisingly, however, in this day when so much good information is available, quackery seems to be growing. More and more, people believe in miracles, not only the real miracles of scientific achievement but also the fake miracles of promoters and charlatans.

Quackery Is Big Business

Quackery in the United States is big business. The medical director of the Hoxsey cancer clinic testified he had personally seen 6,000 patients in 2 years. In his book "You Don't Have to Die," Harry M. Hoxsey said he had

East of the Elbe

IN ADDITION to literature covered by *Excerpta Medica*, by the Russian Translation Service sponsored by the Public Health Service, or by private enterprise, a number of medical publications issued in Communist territories are the subject of notes, abstracts, or full translations which appear twice a month in *Scientific Information Report* (mimeographed), sold by the Office of Technical Services, U.S. Department of Commerce, for \$2.75 a copy or \$28 a year.

In keeping with the intent of Congress, these translation services aim not to distribute information directly to a large audience but to provide librarians, editors, reporters, and scientific investigators with access to original materials, if desired.

The following selections from the medical literature which is covered in the *Scientific Information Report* from July 25, 1958, through January 23, 1959, are intended only to suggest the kind of public health information that may be found. They are merely a sample of a sample.

There is no intent to evaluate the significance or validity of the items mentioned.

In the following paragraphs, reference to specific documents is given as follows: the name of the senior author, the publication number of the *Scientific Information Report*, and the document number. All issues of the report are designated by the code number PB 131891-T. The reference (*Frucht 14, 79*) would therefore refer to PB 131891-T14; item 79, a translation from *Das Deutsche Gesundheitswesen*.

Service Statistics

Goals of the Sanitary Epidemiological Service for 1959-65 were reported to the All Union Scientific Society for Hygienists, in Mos-

cow, February 21, 1958. Objectives include 1 epidemiologist per 25,000, 1 sanitary physician per 40,000, 1 industrial sanitarian per 14,000 workers, 1 school sanitarian per 12,000 urban students, and 1 physician bacteriologist per 35,000 (*Lebedev 5, 94*).

Long-range public health plans for Kazakh S.S.R. call for 24,800 more medical personnel by 1965, a 13-percent increase. It is hoped to double the number of health officers: at present, there is 1 for every 70,000 people. This report contains considerable data on hospitals and medical facilities (*Lobova 2, 77*).

Morbidity

The first all-Russian conference of epidemiologists, microbiologists, and infectionists was held in Moscow in 1957. The 400 delegates and guests approved establishment of an all-Russian scientific medical society for the professions represented.

Nikolayeva, R.S.F.S.R. Deputy Minister of Health, reported complete eradication in the Russian Soviet Federated Socialist Republic of plague, cholera, typhus, smallpox, and other infectious diseases. She said that mass outbreaks of typhoid fever and malaria had ceased. The major concerns she reported were influenza, tickborne encephalitis, poliomyelitis, epidemic hepatitis, and prevention of dysentery, typhus, and diphtheria.

Professor Boldyrev stressed the need to improve sanitary conditions, to improve cultural levels, and to sharpen differential diagnosis of enteric diseases in a program to reduce enteric infections. Reports by Smorodintsev, Tokarevich, and Bunin dealt respectively with virology, rickettsioses, and clinical management of dysentery (*Belikov 7, 87*).

Uzbekistan now boasts 188 sanitary-epidemiological stations, 160 bacteriological labora-

this time as a handbill for display in U.S. post offices, hospitals, and other public buildings. This poster was possibly the most effective educational medium of all.

Quackery in Nutrition

The most widespread quackery in the United States today is in the field of nutrition. The American Medical Association says it is costing some 10 million Americans \$500 million each year. This racket is based on misstatement of the facts of the science of nutrition.

More people seem to believe more bunk about food and nutrition than about any other single topic in the health field—and perhaps any other field. It is this widespread dissemination, and the zealous faith of believers in nutrition nonsense, that make it difficult to combat. Food faddism today has aspects of an organized movement that is self-supporting and actively seeking new converts.

The nature of this racket, and the false concepts which promote it, can be learned from the court actions brought by the Food and Drug Administration. The oldtime patent medicine man is back again—but this time he is a “nutrition educator” who rings your doorbell and tries to persuade you that a shotgun mixture of vitamins and minerals, plus some secret factor which nutrition scientists have not yet identified, is the answer to all your health problems.

Vitamin products have a recognized place in modern preventive medicine, but they are not cure-alls, and it is dangerous for anyone to assume that such products can be relied on to treat unidentified ailments. The price charged for only one package of some of these products is enough to pay for several visits to a doctor.

Numerous self-styled “authorities” on nutrition write books and articles, lecture, and sometimes even teach in our colleges. Some of them have no training whatever in nutrition science. A number of so-called “health food lecturers” have been the target of court actions brought by the Food and Drug Administration. One of them recently completed a 1-year prison term. He was convicted on misbranding charges, resulting from claims that his peppermint tea, vegetable soup mix, and wheat germ oil would restore sexual power and cure such conditions as arthritis, cancer, and diabetes.

Recent court actions under the Federal Food, Drug, and Cosmetic Act include these cases:

Capsules of unsaturated fatty acid from safflower oil with vitamin B. This was recommended by a health food store for preventing and treating practically all heart ailments, obesity, and glandular disorders.

Liquid unsaturated fatty acid from safflower oil with vitamin E, represented as effective for maintaining low blood cholesterol levels and overcoming heart disease.

Lecithin, falsely represented as a cure for hardening of the arteries, high blood pressure, coronary thrombosis, diabetes, prostate trouble, and other conditions.

An especially disturbing feature of food faddism is persistent emphasis on the theme that the American food supply, unmatched in quality throughout the world, is deficient, over-processed, or poisoned by fertilizers, pesticides, and food additives. There are indeed serious new problems of food protection brought about by changing technology that are under constant study, but nothing to warrant the grossly irresponsible and inaccurate statements which have appeared in some faddist books and sensational magazines.

Effective Counteraction

Broadly speaking, effective counteraction against faddism and quackery requires the interest and cooperation of all organizations and agencies concerned with the problem, private and public, lay and professional, local, State, and national. This is particularly the case in the field of information and education. I am glad to say that there is already a great deal of such cooperation.

The Commissioner of Food and Drugs recently pointed out that the public has always had difficulty in distinguishing the orthodox from the unorthodox remedy or practitioner, but that “science today has given us the means of distinguishing with considerable certainty the effective from the ineffective. Likewise our laws, based upon medical knowledge, distinguish between what is legal and what is illegal.” More should be done in explaining these distinctions to the public, as well as applying them in law enforcement.

adolescents, 57; nutrition and food sanitation ("the rational use of food for separate groups of the population and the prophylaxis of alimentary diseases"), 55; the hygienic basis for planning, organization, and construction, 44; atmospheric hygiene, 43 (*Anon. 5, 98*).

Concerned with "the great practical significance of protecting persons from respiratory affection with bacterial toxin," an investigation is studying this potential in *Bacillus botulinus* toxin, "which has no equivalent in strength" (*Yakovlev 5, 56*).

For potential rabies victims, it is recommended that antirabies gamma globulin containing specific antibodies be applied directly to the wound, in conjunction with antiseptics and antibiotics, before administration of the vaccine. (*Solov'yev 3, 52*).

A lozenge held to be prophylactic against streptococci, staphylococci, and other microbes consists of 1,000 gamma gramicidin, 0.07 gram ascorbic acid, 0.002 gram tannin, and 1 gram of sugar and filler (*Anon. 2, 72*).

Persistence of rabies, especially among foxes and other wild animals, has prompted production of a hyperimmunization serum by the State Institute for Rabies Inoculation at Potsdam (*Starke 10, 81*).

Aerosols of volatile oils in a sealed room were found to be effective against *Staphylococcus albus* at Kiev. Eucalyptus appeared to be the most effective oil tested; lavender the least (*Vedibeda 8, 70*).

Production of diagnostic materials in the Soviet Union is deficient with respect to brucellosis, tularemia, and many viral and rickettsial diseases (*Meshalova 9, 72*).

Immunization against brucellosis can be combined with simultaneous subcutaneous inoculation against tetanus, investigators in Moscow conclude on the basis of animal experiments (*Chian Shun-ch'u 16, 74*).

Epidemiology

Among measures recommended at the 12th session of the U.S.S.R. Academy of Medical Sciences, it was proposed: A statistical bureau for the study of the role of population factors in pathology and for working out the methodological indexes for the study of hereditary

diseases should be established in the Institute of the Organization of Public Health. A laboratory of the heredity of man and a laboratory of radiobiology should be organized within the Institute of Experimental Biology and the Institute of Experimental Medicine, U.S.S.R. Academy of Medical Sciences (*Anon. 6, 63*).

Pathology, immunology, and mode of transmission of influenza is being investigated, with respect to the biological and colloid-chemical properties of a virus aerosol trapped in a sponge filter made of gelatin (*Rechmenskiy 1, 68*).

The mucous membrane of the nose is the essential point of infection of animals susceptible to hoof-and-mouth disease, it is concluded from experiments in pathology reviewed for the Thuringian Section of the Scientific Society for Veterinary Medicine in East Germany (*Potel 6, 61*). (This entire review is published in translation.)

Occupational Health

A review of dissertations on labor hygiene by candidates for science degrees found the following topical interests most prominent, in the order given: occupational poisons, industrial dust, physiology of labor, microclimate, industrial trauma, and a miscellany including changes in atmospheric pressure, noise and vibration, morbidity, research methods, and sanitation. The author noted with regret that although the economy requires an increased production of insecticides, only three dissertations related to their toxicity (*Yegorov 16, 85*).

Foam rubber is found satisfactory as a dust filter in face masks tested at the Leningrad Sanitary Hygienic Medical Institute. The filter can be washed with ordinary soap and water and used again effectively, but it offers no "satisfactory standard for pore size" (*Koryukayev 7, 66*).

A cherry-extract drink is found more effective than a 0.5-percent gaseous solution of salt for quenching thirst, preventing dehydration, and maintaining efficiency of men working in high temperatures, according to a Tashkent study, at a Uzbek metallurgical plant. The drink is now the customary beverage in shops where heat is intense (*Anon. 8, 79*).

tories, and 33 pasteurization stations. Registered cases of malaria have dropped from 121,000 in 1950 to 659 in 1956. Smallpox has been "liquidated" since 1936 (*Zairov 9, 57*).

Diphtheria in Byelorussia was reported in 1957 to be 9.8 per 10,000 population, 30.6 per cent below the 1956 rate (*Rubinshteyn 4, 41*).

Environmental Services

In recommending filtration and active dilution of air pumped out of nuclear reactor power stations, a Czechoslovakian paper concludes it is necessary to develop less hazardous types of reactors (*Anon. 2, 67*).

The first "scientific-practical" conference on sanitary inspection of food products for the entire Soviet Union was held in Moscow in June 1958. (Reports of the principal speakers are summarized lightly in the translation.) Leading causes of "food poisoning" were bacterial infection, primarily of meat, followed by dairy products (*Krapivner 16, 84*).

A Committee for the Protection of Atmospheric Air has been established in the Main State Sanitary Inspectorate of the U.S.S.R. Ministry of Health by an order dated May 5, 1958. Chairman is Prof. V. A. Ryazanov, director of the chair of communal hygiene of the Central Institute for the Advanced Training of Physicians (*Anon. 10, 91*). A book on air pollution control, published in 1957, is the subject of a translated review (*Gernet 10, 93*).

Gamma rays are used to sterilize bandages impregnated with antibiotic medication, by the Division of Antiepidemic Defense of the Central Scientific Research Disinfection Institute. The dose to inactivate anthracoid spores is reported to be 1.5-2.0 million roentgens (*Anon. 5, 66*).

Studies of radiopotassium (K^{40}) find 2.3×10^{-11} curies per liter in mixed city sewage, 6×10^{-12} in suburban sewage, and 1.7×10^{-11} curies in sewage from industrial areas. In nature, K^{40} in city sewage is thought to be in the range of 6×10^{-12} curies per liter. The per capita discharge in the city is estimated at 300 micrograms of K^{40} per day, about 2×10^{-9} curies (*Dolivo-Dobrovolskiy 6, 50*).

Nonpathogenic spore soil saprophytes re-

sistant to chlorination in a public water supply of the Donbassvostrest have created difficulties in applying the bacterial count standards for water quality. An investigation is reported in detail (*Natanson 16, 82*).

Preventive Medicine

Merger of rayon hospitals with sanitary-epidemiological stations was discussed at the fifth congress of the Medical Workers' Trade Union, Moscow, May 29, 1958. Golovkova said that with the present workload, a medical district physician has no time to organize preventive work. Popov said that mergers have been beneficial in rural districts, but that the distribution of the physician's work is unsolved.

Delegates also complained that too little attention is given to the health and safety of medical workers, that the Ministry of Health issues directives without enforcing their application. Research workers were chided for giving too little heed to public health needs, but Suchkova in turn chided public health workers for failing to keep up with medical advances.

In order to extend the effectiveness of medical services, with an average of 1 physician for 600 people, M. D. Kovrigina, Minister of Health, urged strengthening outpatient clinics, and said they must arrange to eliminate waiting lines and to treat people in the evenings or on their day off from work. The number of physicians may be increased at the expense of auxiliary branches of the profession. Also, she proposed reduction of the volume of paperwork by doctors.

She and others stressed the value of health education. It was asserted that more than 500,000 medical deputies of Red Cross and Red Crescent societies are seeking to provide health information for the public.

The conference voted approval of a resolution supporting suspension of nuclear tests (*Anon. 4, 54*).

Of 684 themes announced for 86 hygienic establishments of the R.S.F.S.R. Ministry of Health, 284 deal with labor hygiene and prevention of occupational disease. The balance of the score card is: radiation hygiene, 102; water hygiene, 99; hygiene for children and

cent dyes, used in observing agents of herpes, hoof-and-mouth disease, lymphogranuloma, swine plague, chickenpox, shingles, encephalitis, psittacosis, and other viral diseases, has been employed also in the study of tickborne encephalitis. The process is described in translation in detail. An illustration of the apparatus and two electrophoregrams are included in the original paper (*Izotov 8, 68*).

Information Services

It is proposed to expand and expedite publication of reports of Soviet research in radiobiology: fewer than a third of the reports sub-

mitted in 1956 and 1957 have been printed (*Anon. 3, 65*).

Soviet participation in international medical programs has resulted in a rise in their contributions to Western journals and an increased attendance at international conferences. Nearly 2,000 abstracts of works by Soviet specialists have been published in *Excerpta Medica*, and 6 special editions of that journal have been devoted to Soviet works (*Ivanova 7, 88*).

Continuous courses have been organized for raising the qualifications of sanitation physicians, chemists, bacteriologists, laboratory assistants, and workers of sanitary-epidemiological stations (*Anon. 7, 91*).

Translations From Russian Medical Works

The Russian Scientific Translation Program, set up in the National Institutes of Health, Public Health Service, in July 1956, distributed 42 completely translated issues of several Soviet journals to 400 research libraries during 1958. The issues represent a total of 1,470 papers in biochemistry, biophysics, experimental biology and medicine, microbiology, epidemiology, immunology, hematology and blood transfusion, oncology, virology, and physiology.

From the program's inception until October 1957, the activities concerned principally the supply of supplementary materials to scientific groups for their independent evaluation of Soviet experimental work. During fiscal 1958 the emphasis shifted to materials for evaluation, field by field. Future plans include a mechanism to gauge both the needs of the scientific fields for information and the adequacy of the program in fulfilling those needs.

The cover-to-cover translation of basic science journals is a major feature of the program.

Another activity has produced 2,990 abstracts of Soviet medicine in four quarterly issues for both basic medical sciences and

clinical medicine. Another 5,100 more abstracts are in prospect.

The program also provides grants to support preparation of reviews of Soviet literature by American scientists in such fields as cardiovascular physiology, neurochemistry, nutrition, defectology, and air pollution. Also, a list of 300 Russian scientific review papers were sent to about 150 editors of American journals, many of whom requested translation of listed papers. Republication of some papers is scheduled in a number of journals.

Reference works, such as the "Directory of Medical and Biological Research Institutes of the U.S.S.R.," "A Guide to Russian Medical Literature," and a "Russian-English Medical Dictionary," are products of the program, which is also planning the publication in English of selected Russian monographs.

The "Bulletin of Translations From Russian Medical Sciences" lists available translations and services and gives pertinent information about other translation programs, Government and private.

Address inquiries to the Russian Scientific Translation Program, National Institutes of Health, Public Health Service, Bethesda, Md.

Neurophysiological effects of vibrations are the general subject of a series of experiments reviewed in one chapter of a book issued by the State Publishing House of Medical Literature, Leningrad (*Mogendovich 9, 84*).

Protracted systematic vibration retarded the accumulation of body weight in young rats in an experiment performed at the Moscow Sanitary Hygiene Medical Institute (*Lebedeva 7, 65*).

A chemical called Unitol was reported effective in treating 25 clinic patients suffering from absorption of arsenic and mercury compounds (*Belonozhko 1, 60*).

Diagnosis and Therapy

The basic aim of the new Institute of Physiology and Pathology of Women (Institut Fiziologii i Patologii Zhenshchiny) established at Tbilisi by the Georgian S.S.R. Ministry of Health, first of its kind in the Soviet Union, is to increase the birth rate. It seeks to decrease the incidence of abortions and find solutions to infertility (*Anon. 11, 102*).

To detect the presence of cancer in the organism, a Czechoslovakian news report asserts, A. Chizhevskiy, of the oncological institute in Karaganda, has devised a mathematical formula for the movement of blood cells in the veins (*Anon. 5, 63*).

Tetraethylmonothiopyrophosphate was administered subcutaneously in a dose of 0.06 mg/kg. to mice suffering traumatic injury to the sciatic nerve, and induced recovery two to three times more rapidly than in controls. The application of the chemical in victims of poliomyelitis was mentioned as a possibility (*Lenkevich 11, 75*).

Animal experiments indicate that muscles repair and restore themselves more rapidly if supplied with a direct deposit of minced muscle tissue (*Gavrilova 11, 95*).

A transistorized transmitter, 610 grams, 4.4 x 9 x 14 cm., was built by the Institute for Applied Physiology of the East German Academy of Social Hygiene, Labor Hygiene, and the Advanced Training of Physicians, Berlin. It is used for obtaining electrocardiographs (*Frucht 14, 79*).

Tape recordings are being used to hypnotize

some patients in the psychotherapeutic department, headed by Dr. Wicht, in the polyclinic of the Friedrich-Schiller University of Jena, which celebrated its 400th anniversary in 1958 (*Anon. 7, 94*).

Use of radiophosphorus to diagnose breast cancer produced some evidence that absorption of phosphorus by the malignant tumor depends on the intensity of the processes of renewal of the nucleic acids in the growing area (*Dmitriyeva 4, 66*).

A Czechoslovakian spray gun for treatment of second-degree burns uses a mixture of thrombin, antibiotic, plasma, and oxygen to form a film (*Bares 10, 86*).

Ordinary gypsum, used in therapy of burns, is reported to be an excellent physical antiseptic, also eliminating pain in the burned area and preventing plasmorrhaxis. It was applied to 264 patients at the surgery clinic of the Odessa Institute for the Advanced Training of Physicians. Burns of 34 patients covered more than 40 percent of the body (*Mežnik 8, 66*).

Eradication of schistosomiasis by mass treatment is a near-term objective of the People's Republic of China (*Koehergin 11, 99*).

Artificial teeth were implanted in jawbones of unspecified animals. Connective tissue grew in the canals of the plastic roots and ossified. Attempts at implants in humans were not successful, but experiments with nonirritating alloys are in preparation (*Bazhanov 1, 76*).

Laboratory Services

Dead or alive, rickettsiae are made visible for study by fluorochromes and special optical apparatus. Clearest contrast and most intensive luminescence was achieved by staining the organisms with rivanol or auramine in an aqueous solution, one part to a thousand (*Mitereva 4, 44*).

For observing ornithosis virus particles by means of fluorescence under a microscope, an aqueous solution of acridine orange (1:30,000) is reported to be the most effective dye. A bright green light contrasts with dull luminescence in other formations (*Neustroyev 16, 69*).

Luminescent microscopy, employing fluores-

- The Soviet Union's system of medical care does not provide for free choice of physician by the patient, nor does it usually allow the physician to select his place of practice.

- Soviet medicine is, to a large extent, dependent upon clinical diagnosis with a minimum of laboratory support. The Soviet pharmacopeia in practice is much more limited in quantity and quality than that in the United States as to range of available antibiotics and chemotherapeutic agents.

- The Soviet Union is giving high priority to the extension of medical care and the improvement of health. Health and medical services are provided without cost to all citizens of the Soviet Union.

- Special attention is given to mothers prior to delivery of their children and during the postpartum period. Facilities are widely provided for daytime care of preschool children so that mothers can be released for work. Health departments are taking an active part in city planning from the standpoint of sanitation and health facilities.

The five-man mission consisted of Dr. Thomas Parran, chairman, former Surgeon General of the Public Health Service (1936-1948), now president and trustee of the Avalon Foundation, New York City; Dr. Otis L. Anderson, Assistant Surgeon General for Personnel and Training, Public Health Service; Dr. Henry van Zile Hyde, Assistant to the Surgeon General for International Health, Public Health Service; Dr. Malcolm Merrill, California State director of public health; and Dr. Leonid S. Snegireff, associate professor of cancer control, Harvard School of Public Health.

The mission's findings are contained in "The Report of the U.S. Public Health Mission to the Union of the Soviet Socialist Republics" (Public Health Service Publication No. 649). It may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., at 45 cents a copy. Single sample copies may be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.



A typical market scene and food displays in the Asian Republics, where farm produce is sold for private profit in the open market.

Public Health Mission

to the

SOVIET UNION

AN "almost explosive extension" of disease prevention and medical care has taken place in the Soviet Union but the quality of service falls short of that found in the United States, according to the report of a mission of five American physicians who visited the Soviet Union late in 1957 under the U.S.-U.S.S.R. exchange program.

With the objective of studying public health problems and practices, the group traveled 8,500 miles and visited 61 institutions in 9 cities in 5 of the Soviet Republics during the period August 13-September 14, 1957. They found that medical care in the Soviet Union has been "tackled with vigor." There is a high ratio of physicians, and many hospitals have been built to serve the cities and rural areas. The group also found, however, that the Soviet Government has deliberately focused on quantity and widespread coverage of personnel and services at the expense of quality.

The report states that Soviet medical establishments are "antiquated or jerry-built" in contrast with those in the United States. It points out, however, that there are "certain ingredients in their political system and in their ability to accomplish mass transfer of brain and brawn from one field of endeavor to another which could permit astonishingly rapid changeover and developments in medicine as impressive as the appearance of Sputnik."

Pestilential diseases and the diseases of filth have been substantially brought under control. Malaria as a significant health problem is on the way to eradication. Venereal disease has

been mastered, but tuberculosis remains a plague.

Types of institutions visited included administrative public health headquarters, industrial health services, medical teaching institutes, "medium-medical schools," medical research institutes, local public health facilities, sanitary-epidemiological stations, urban and rural health centers, child nurseries ("creches"), rest homes, city markets, industrial plants, collective farms, and a number of other special medical facilities and institutions.

Other findings of the mission include:

- The health program of the Soviet Union is, like all programs, subject to the needs of the state and is therefore circumscribed by a series of allocations and goals. The health program is an instrument of state policy because the Soviet Union recognizes the importance of having a healthy working class if it is to achieve its major goals.

- Women represent the majority of practicing physicians in the Soviet Union.

- Medicine is considered an important but not a primary contributor to the Soviet economy. The average Soviet physician does not enjoy the same status as a Soviet engineer.

- The number of physicians trained annually exceeds the number trained in the United States, but the quality of basic training is at a much lower level.

- Clerical help and office equipment of the kind found in United States medical facilities are regarded as "unheard-of luxuries."

- The Soviet Union's system of medical care does not provide for free choice of physician by the patient, nor does it usually allow the physician to select his place of practice.

- Soviet medicine is, to a large extent, dependent upon clinical diagnosis with a minimum of laboratory support. The Soviet pharmacopeia in practice is much more limited in quantity and quality than that in the United States as to range of available antibiotics and chemotherapeutic agents.

- The Soviet Union is giving high priority to the extension of medical care and the improvement of health. Health and medical services are provided without cost to all citizens of the Soviet Union.

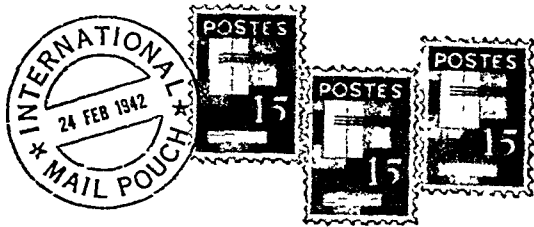
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A typical market scene and food displays in the Asian Republics, where farm produce is sold for private profit in the open market.



Cambodian School

The teaching staff of the new school of nursing and midwifery in Phnom Penh is entirely Cambodian. Two nursing education advisers of the World Health Organization were asked, as a courtesy, to teach certain classes, but the school is almost wholly a Cambodian undertaking. Three of the faculty members are former trainees sponsored by the U.S. Operations Mission. Another trainee, who is studying nursing education in Montreal, Canada, will head the midwifery section of the school when she returns.

—CARLETON B. WHITE, M.D., *chief, Public Health Division, U.S. Operations Mission, Cambodia.*

House of Earth

A self-help plan is assisting city dwellers in Brazil to build and own their own homes at a cost of \$135 for materials. Serviço Especial de Saúde Pública has adapted to municipalities the aid system traditional in farming areas. A prefeitura, or municipal government, after creating the self-help service by municipal law, signs an agreement with SESP for administrative operation of the project by SESP engineering, public health education, and other staff members.

The houses, built according to minimum standards under this pilot project, have two rooms and a veranda which serves as kitchen and living room. Walls are of soil-cement blocks made by machine and compacted by the people themselves. The city grants the land, and materials are bought from a rotating fund made up of annual contributions from SESP and the municipality. The owner has 4 years to repay the loan; afterwards he owns the house he helped to build.

The Serviço has published "Casa de Terra," by Alvaro Milanez, technical consultant to SESP, which indicates some of the techniques, such as

rammed earth, adobe, wattle and daub, sod, and soil-cement, used in earth construction. The booklet is not a construction manual but is designed as a guide for public health workers and technicians in assisting those who want to build or improve dwellings. "Casa de Terra" can be obtained through the Health and Sanitation Division, U.S. Operations Mission, Brazil, for 50 cents a copy.

—E. ROSS JENNY, M.D., *chief, Health and Sanitation Division, U.S. Operations Mission, Brazil.*

Male Prerogative

Only the men became ill after a community birthday party in Songsa Ri, Korea, where the 400 villagers all have the same name and are all related to each other in some way.

At the invitation of the director of the Wondong health center, I went to investigate the outbreak; 38 men were still extremely sick 1 or 2 days after the celebration. I discovered the fried pork served at the party came from two pigs. One had died of natural causes, and the other had been ill prior to slaughter. *Salmonella* organisms were later isolated.

None of the women or children were ill because the men of Songsa Ri, following the custom of rural Korea, had dined first and eaten all the pork.

—WALDO SMITH, *sanitarian, U.S. Operations Mission, Korea.*

Precursor

Of much more value than Freud for his people is a dream book written by a Moslem healer, Ibn Sireen, said the first psychiatrist in the Sudan, Dr. Tigani el Mahi. However, the psychiatrist found a similarity between Freud and Sireen, who lived more than a thousand years ago. "Our book says that dreams are prophetic. Freud says dreams express wish fulfillment. What is prophecy but the foretelling of wishes coming true?" said Dr. Mahi, who spoke at the 1959 meeting of the American Orthopsychiatric Association in San Francisco.

When he returned to the Sudan after training in London, Dr. Mahi said he was surprised by the valid psychological insights of religious healers and medicine men in his country. He said he often referred patients to them, and they, in turn, were beginning to refer patients to him.

Infectious Encephalitis

In Colorado

LUTHER E. GIDDINGS, M.D.,
STEPHEN G. COPPS, M.D.,
CLARENCE A. SOOTER, Ph.D.

BETWEEN May 1, 1956, and December 31, 1957, 258 cases of infectious encephalitis in Colorado were reported to us by physicians, hospital personnel, local health departments, and the Colorado State Department of Public Health. For most of these cases, it was necessary for us to rely on the clinical judgment of those making the diagnosis; since the acute phase of the illness had generally passed by the time the case was reported, laboratory diagnosis was not possible. Infectious encephalitis is generally defined as an acute disease process in which the patient exhibits typical signs and symptoms of central nervous system involvement (headache, fever, stiff neck and back, drowsiness, and spinal fluid pleocytosis) with a micro-organism as the presumed etiological agent.

This paper presents certain epidemiological aspects of this syndrome observed in the above-mentioned cases and compares some of these aspects as they differed according to the etiological agent involved.

Methods

Attempts were made to gather basic epidemiological information on all cases as they were reported. This information included, among other things, geographic, time, age, and sex data for each case. At the end of the 20-month period these isolated bits of information were compiled to demonstrate the geographic, time, age, and sex distributions of the cases.

Serum specimens were collected from patients when possible. In general, these specimens were paired, with one specimen taken early in the course of the disease (acute phase) and the second taken 3 to 6 weeks later, during

convalescence. Occasionally, only convalescent-phase specimens could be collected.

All specimens were tested with the hemagglutination-inhibition (HAI) test for antibodies against St. Louis encephalitis (SLE) and western encephalitis (WE). Most of the specimens were also tested with the serum neutralization (SN) test for antibodies against the same diseases. If sufficient sample remained it was tested with the complement fixation (CF) test for antibodies against mumps, lymphocytic choriomeningitis (LCM), and eastern encephalitis (EE) in addition to SLE and WE. (All CF tests were performed by the Communicable Disease Center, Virus and Rickettsia Laboratory, Chamblee, Ga.) The three poliomyelitis types were added to the CF battery in 1957. Also in 1957, convalescent-phase specimens from 27 patients which showed insignificant antibody titers in all the above tests were subjected to the SN test for ECHO viruses, types 2, 4, 6, and 9, and serums from 18 patients were subjected to the SN test for Colorado tick fever. (Tests for ECHO viruses were performed by the department of pediatrics, University of Colorado Medical Center, Denver, Colo. For Colorado tick fever, tests were performed by the Rocky Mountain Laboratory, Hamilton, Mont.)

A case was considered serologically "confirmed" if a fourfold rise in HAI or CF titer or tenfold rise in neutralization index could be demonstrated in paired specimens. A case was considered serologically "suggestive" when a CF titer of 1:8 or HAI titer of 1:80 was present but a rise in titer could not be demonstrated. The cases were then categorized ac-

Dr. Giddings, at the time of this study, was epidemic intelligence service officer with the Encephalitis Investigations Unit, Greeley Field Station, Communicable Disease Center, Public Health Service, Greeley, Colo. He is now a resident in pediatrics at Salt Lake County General Hospital, Salt Lake City, Utah. Dr. Copps, formerly on the staff of the Children's Hospital, Denver, Colo., is now with the Medical Corps, U.S. Army, Fort Riley, Kans. Dr. Sooter, formerly chief of the Greeley Field Station, is currently executive secretary, Research Fellowships Branch, Division of Research Grants, National Institutes of Health, Public Health Service.

Table 1. Etiology of 258 cases reported as infectious encephalitis in Colorado between May 1, 1956, and December 31, 1957

Classification	Method of diagnosis	Number of cases
St. Louis encephalitis	Serologic	21
Probable St. Louis encephalitis	do	27
Western encephalitis	do	20
Probable western encephalitis	do	5
Mumps	do	1
Mumps	Clinical	23
Measles	do	1
Influenza	do	4
Influenza	Serologic	1
Postvaccinal encephalitis	Virus isolation	1
Poliomyelitis type 1	Clinical	1
Poliomyelitis type 2	Serologic	2
Colorado tick fever	do	1
Etiology unknown	do	1
		149

cording to etiology by month of onset and age and sex of the patient.

Results

Study revealed that the 258 cases were, for the most part, roughly distributed in proportion to population density throughout Colorado. There were two exceptions to this rule. One was Grand Junction in Mesa County, and the other, the plains area in eastern Colorado. An

unusually high attack rate was seen in both of these places as a result of localized outbreaks of SLE in the summer of 1956. Cases were reported in each of the 20 months under discussion. The majority of the cases, however, are grouped together into two separate time periods: the late summer and early fall months of 1956 and the same period in 1957.

Each age group was involved, with the youngest patient 6 days of age and the oldest 82 years. There was, however, a marked preponderance of cases among people under 20 years of age, particularly among those under 10.

The etiological agent was defined by laboratory or clinical means in 109 of the 258 cases (table 1). The arthropod-borne diseases, SLE and WE, accounted for 67.0 percent of the cases in which the etiology is known, while mumps accounted for 22.0 percent. Influenza was next in line, followed by poliomyelitis, measles, Colorado tick fever, and postvaccinal encephalitis.

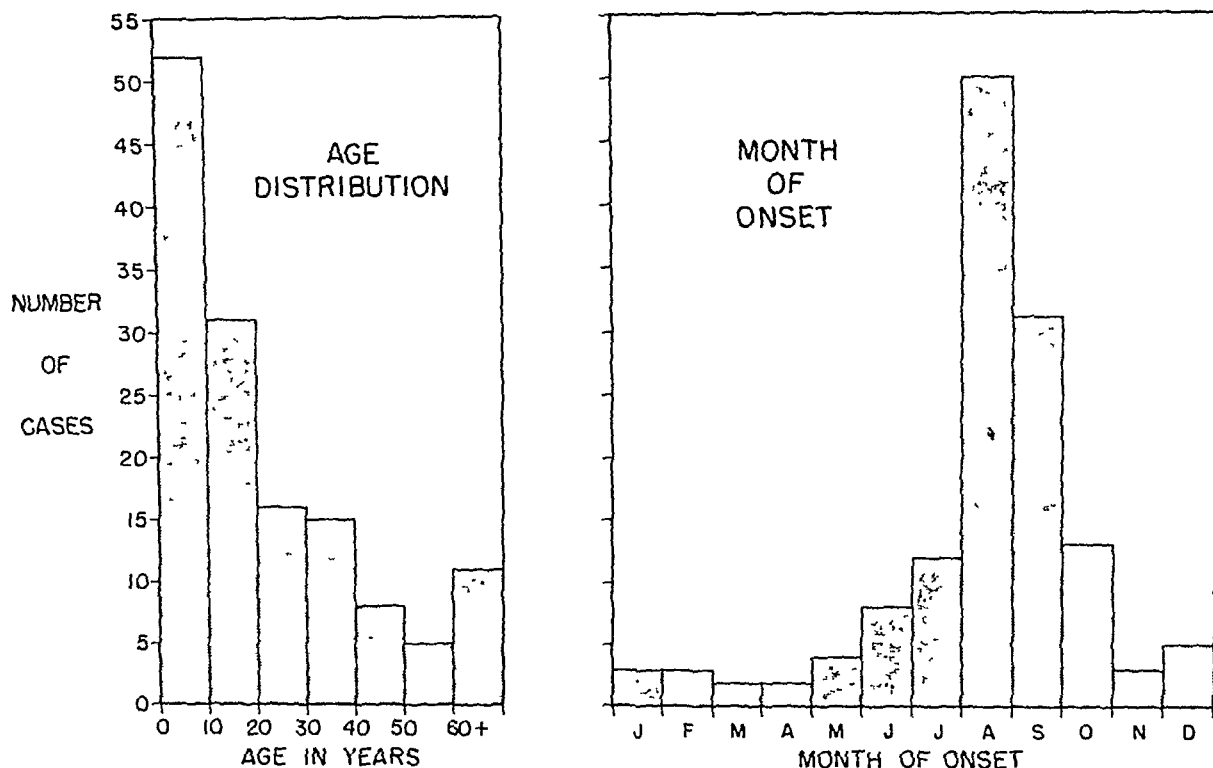
An effort was made to exclude cases of nonparalytic poliomyelitis from the study. The three cases that are included were originally reported as infectious encephalitis, and it was only on subsequent serologic examination that the true etiology of the disease became known. On the other hand, two cases which were originally reported as nonparalytic poliomyelitis were subsequently found, on serologic exami-

Table 2. Results of serologic tests for various etiological agents of infectious encephalitis

Disease	Ratio of cases ¹ to paired specimens tested			Percent positive of those tested
	1956	1957	Total	
St. Louis encephalitis				
Western encephalitis	43/61	5/64	48/125	38.4
Mumps	3/61	22/64	25/125	20.0
Lymphocytic choriomeningitis	0/45	1/46	1/91	1.1
Eastern encephalitis	0/45	0/46	0/91	0
Poliomyelitis type 1	0/45	0/46	0/91	0
Poliomyelitis type 2	0/0	2/46	2/46	4.4
Poliomyelitis type 3	0/0	1/46	1/46	2.2
Asian influenza	0/0	0/46	0/46	0
Colorado tick fever	0/0	1/2	1/2	50.0
	0/0	1/18	1/18	5.6
Results conclusive				
Results inconclusive	46/61	33/64	79/125	63.2
	15/61	31/64	46/125	36.8
Total	61/61	64/64	125/125	

¹ Includes "confirmed" and "suggestive" cases.

Figure 1. Cases of unknown etiology reported as infectious encephalitis, Colorado, July 1, 1956–December 31, 1957.



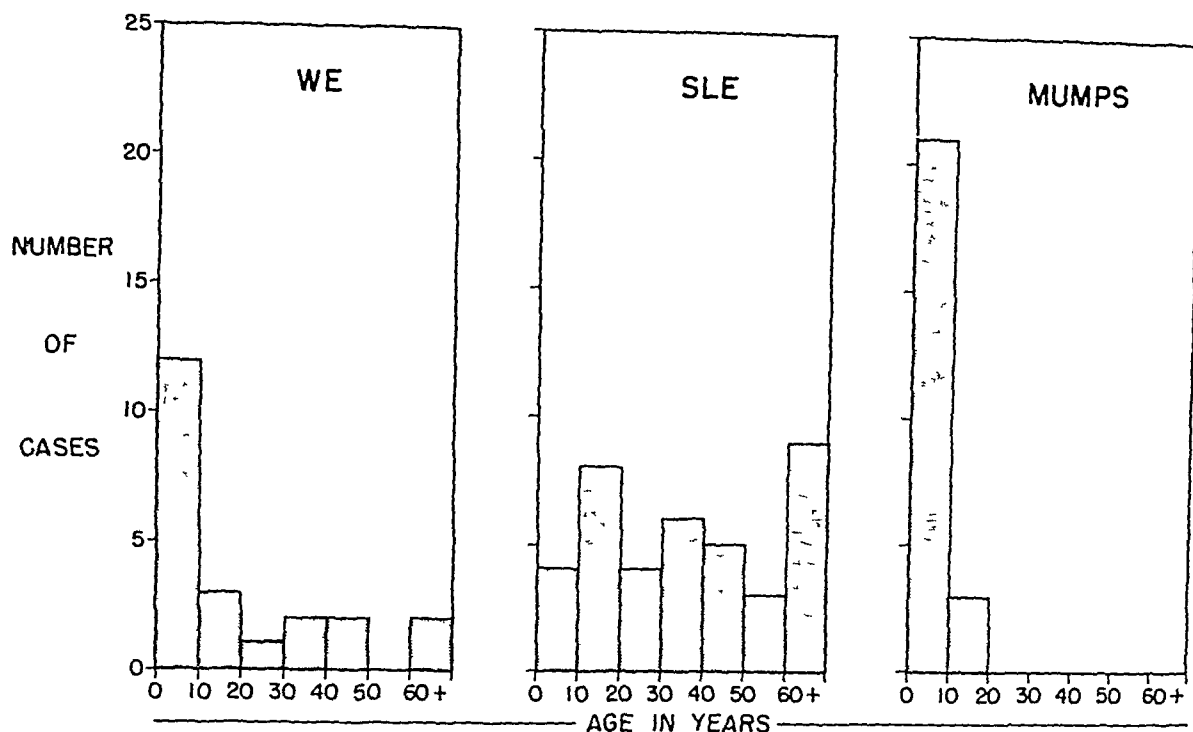
nation, to be WE. The largest group, unfortunately, is that in which the etiological agent is unknown. This group is composed of 149 cases, or 57.8 percent of the total number.

Results of the serologic tests can be seen in table 2. The largest number of specimens (125) were tested for antibodies against SLE and WE. These two diseases, in order, were responsible for the largest numbers of serologically confirmed and suggestive cases. Fifty percent of those tested for Asian influenza were confirmed to give the highest ratio of cases to paired specimens tested in this series. However, this involved serum specimens from only two individuals. SLE was next highest with 38.4 percent, followed by WE with 20.0 percent. Smaller percentages were noted for the other diseases mentioned previously. Low-level antibody titers against various types of ECHO virus were found to be present in 8 of the 27 (29.6 percent) convalescent-phase specimens tested. None of the specimens had antibodies against type 4, two had antibodies against type 2, six had antibodies against type 6, and five

had antibodies against type 9. Two specimens had antibodies against types 6 and 9, one against types 2 and 9, and one against types 2, 6, and 9. No attempt will be made to interpret these results since it is not known whether any of the serums underwent a rise in titer. Attempts at interpretation would be made still more hazardous by the lack of knowledge concerning the presence of such antibodies among the general population in this area. One of the 18 (5.6 percent) tested for Colorado tick fever was considered "confirmed" on the basis of an 18-fold rise in neutralizing titer. Moderately high titers were demonstrable in the serum of three other patients, but, again, since there was no significant rise in titer, no attempt will be made at interpretation.

As noted previously, the largest group studied was that in which the etiology was unknown. Age distribution and distribution by month of onset for that group are given in figure 1. The seasonal distribution for the next three largest groups, SLE, WE, and mumps, may be seen in figure 2, and the age distribution

Figure 2. Seasonal distribution of western encephalitis, St. Louis encephalitis, and mumps encephalitis, Colorado, May 1, 1956–December 31, 1957.



in figure 3. The age distribution was somewhat alike for WE, mumps, and cases of unknown etiology in that the disease was primarily in individuals under 20 years of age. SLE showed fairly even case distribution among all age groups with only a slightly larger number of cases among older people. The seasonal distribution of cases of unknown etiology (fig. 1) looks somewhat like a composite of the distribution of SLE, WE, and mumps (fig. 2), with cases occurring in each month of the year. An increase in the number of cases starts in May, continues through June and July, and reaches a peak in August. From there it declines gradually through the month of October. WE and SLE are restricted to the late summer and early fall months, while mumps is seen in all seasons, but primarily in the spring. The sex distributions, shown below, for WE, SLE, and mumps are similar, with more males than females in each group.

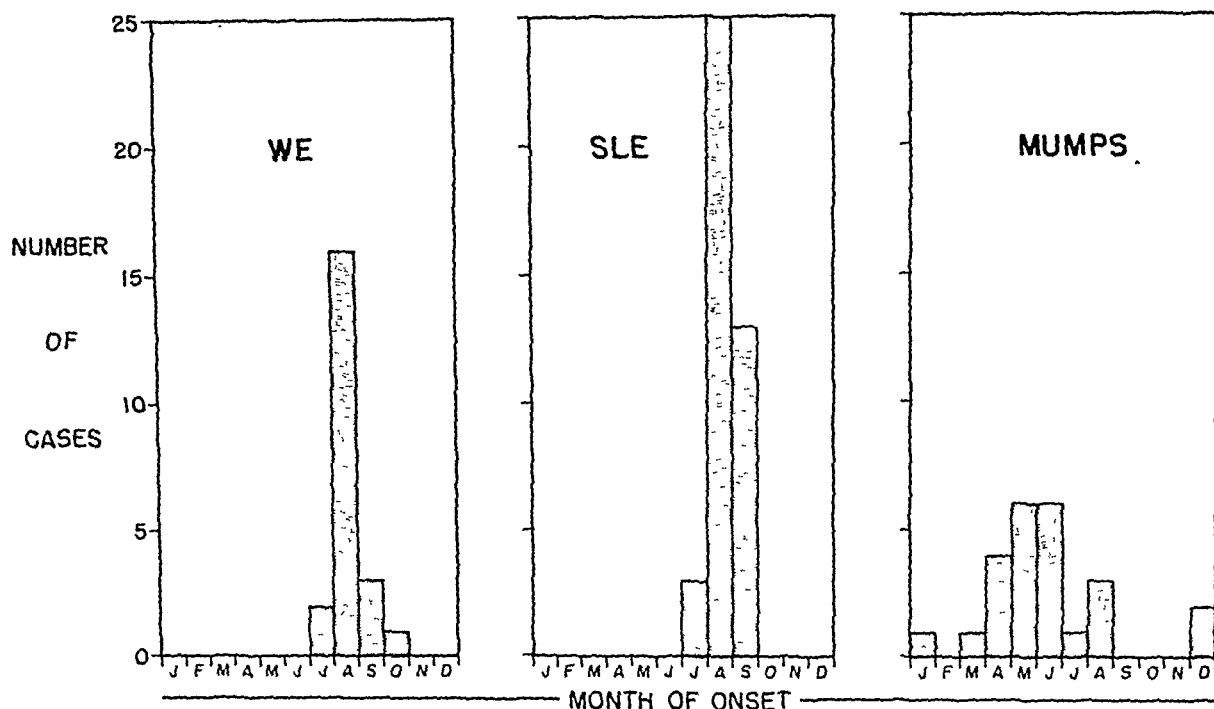
	Number of cases		
	WE	SLE	Mumps
Male.....	16	23	18
Female.....	7	19	6

There were 10 deaths among the 258 patients. One of the fatal cases, with signs and symptoms typical of encephalitis, was felt to be due to Asian strain type A influenza since the virus was cultured from a piece of lung tissue taken at autopsy. Two of the deaths were thought to be possibly due to SLE because of moderately high antibody titers in specimens taken during the acute phase. In each case the patient died before a second specimen could be obtained. Virus isolation attempts were made on a section of brain from one of the two patients, but no viruses were obtained.

Discussion

The fact that the cases of infectious encephalitis observed were distributed roughly in proportion to the human population would lead one to believe that the causative agents are widely distributed within the State. All the agents are not known, but SLE, WE, and mumps would appear to be particular problems. However, since a special effort was made to search out cases of SLE and WE, it may be that

Figure 3. Age distribution of western encephalitis, St. Louis encephalitis, and mumps encephalitis, Colorado, May 1, 1956–December 31, 1957.



the importance of these two diseases is exaggerated. It is entirely possible that an even greater problem lies hidden among those cases of unknown etiology but we have no evidence of such. It is only possible to theorize concerning the possible agents involved in that group. It would seem likely that some of the cases on which laboratory procedures were not carried out were nonparalytic poliomyelitis and WE, or were due to encephalitogenic types of ECHO or Cocksackie viruses. This assumption can be borne out to a minor degree by comparing the age distribution and epidemic curves of these cases of unknown etiology (fig. 1) with those of outbreaks of the diseases mentioned above (1-3). The significance of the presence of antibodies against certain types of ECHO viruses among some of these patients is not known. SLE can also be compared as far as the epidemic curve (fig. 2) is concerned, but the age distributions do not compare well (fig. 3). A number of those cases which occurred in the winter, spring, and early summer might very well have represented mumps encephalitis without clinical parotitis. It has been noted in the

past that as many as 50 percent of the cases of mumps encephalitis fit into this category (4).

Unfortunately, many cases of encephalitis are never reported to authorities in Colorado. With more complete reporting and the submitting of specimens for testing from most of the encephalitis patients, it seems likely that mumps would become the largest etiological group, as it is in California (5). An additional problem is the confusion in attempting to differentiate between nonparalytic poliomyelitis and infectious encephalitis on a clinical basis. It is generally agreed among those who do a great deal of work with acute diseases of the central nervous system that the only reliable way to make such a differentiation is on the basis of laboratory findings.

Probably the most striking feature, though one that would not be unexpected, is that all cases of mumps encephalitis were seen in patients under the age of 20. While WE shows a tendency to infect people of most ages, it is obvious that this disease, like mumps, attacks more people in the younger age groups than in the middle and older age groups.

SLE tends to infect people of all ages, with a slight preference for the older age groups. The difference between mumps and SLE can be explained by the fact that mumps is a highly infectious disease, endemic in most areas of this country, which becomes epidemic whenever a sufficient number of people who are not immune are present. This means that as children are born following a mumps epidemic the stage is being set for a new epidemic several years later. As a result of these frequent epidemics most people become immune before reaching an advanced age. SLE and WE, on the other hand, while they are both endemic in Colorado (6), can probably be spread only by the bite of an infective mosquito (7). The incidence of these two diseases in a community is therefore dependent on mosquito populations and mosquito infection rates and numerous other poorly understood factors. In light of our present knowledge, the age distribution differences between SLE and WE cannot be explained.

The preponderance of male patients infected with the SLE and WE viruses could possibly be explained by the fact that men and boys in general spend more time out-of-doors and are, hence, at greater risk of exposure to infective mosquitoes. This does not, of course, hold true with infectious parotitis since both sexes are generally affected equally (8).

Summary

A total of 258 cases of encephalitis were brought to the attention of the authors between May 1, 1956, and December 31, 1957. There were 10 deaths in this group. Geographic, time, age, and sex distributions of the cases were noted.

The viruses of SLE, WE, and mumps were the most common causative agents. Epidemiological characteristics of these three types of encephalitis were compared.

More diagnostic work needs to be done in the field of infectious encephalitis in order better to evaluate the problem brought about by the large number of agents which can produce this syndrome.

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HORIZONS in Rural Health

THE 14th National Conference on Rural Health was held in Wichita, Kans., March 5-7, 1959, under the sponsorship of the Council on Rural Health, American Medical Association. Representatives of farm organizations, the council, and State medical societies, and workers in the agricultural extension service and in official and voluntary health agencies attend these conferences, held in a different part of the country each year.

The Council on Rural Health is the official body representing the rural health interests of 160,000 physicians who constitute the American Medical Association. The group was appointed in 1945 by the association's board of directors in response to an invitation from the American Farm Bureau Federation to join with it in a study of the rural health situation. Dr. Franklin S. Crockett, Lafayette, Ind., has been chairman since 1945. Advisers have been added to the original group to increase representation of agricultural producers and educators.

Every national conference has stressed the theme of self-help and the roles of the individual general practitioner and the individual citizen in meeting personal and community health needs.

During recent decades, many changes have taken place in rural America. The city-limit sign no longer sets families living in towns apart from those living in the open country, with each having different sets of living standards and widely differing opportunities for health services.

Many factors have contributed to a revolution in farm family living: electricity on the farm and in the farm home, improved roads, greater ease of travel, and higher family income. New hospital construction, particularly since the 1946 enactment of the national hospital and medical facilities construction program, has helped to arrest the decline of health services in rural areas. Voluntary health insurance as a means of budgeting family medical and hospital expenses has been widely

SLE tends to infect people of all ages, with a slight preference for the older age groups. The difference between mumps and SLE can be explained by the fact that mumps is a highly infectious disease, endemic in most areas of this country, which becomes epidemic whenever a sufficient number of people who are not immune are present. This means that as children are born following a mumps epidemic the stage is being set for a new epidemic several years later. As a result of these frequent epidemics most people become immune before reaching an advanced age. SLE and WE, on the other hand, while they are both endemic in Colorado (6), can probably be spread only by the bite of an infective mosquito (7). The incidence of these two diseases in a community is therefore dependent on mosquito populations and mosquito infection rates and numerous other poorly understood factors. In light of our present knowledge, the age distribution differences between SLE and WE cannot be explained.

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out as "an unparalleled achievement in disease prevention." Where fluoridated water is not available, topical application of fluorides to the teeth greatly reduces dental caries.

Accidents

Accidents result in approximately 12,000 deaths and another 1 million injuries among rural people in the United States annually. Because of this record, the National Grange asked its 7,000 local groups to keep account of accidents in their communities during the past year. In addition, nearly 1,000 local granges sponsored local safety programs.

Occupational health programs for people employed in agriculture are in their infancy. Farm mechanization has increased at a rapid rate without the same attention to safeguards against accidents that has been given in industry. Brucellosis and other animal diseases communicable to man are another hazard of farming, and the continued cooperation of the medical profession, public health agencies, and local citizens is required to control them.

Future Needs

Dr. Franklin Murphy, chancellor of the University of Kansas, outlined major needs for the future:

- More planned organization of area medical service, carried out by governmental agencies, citizens, and other groups working jointly, with patients and services flowing freely in both directions from the center to the periphery.

- Continued remodeling of professional education, both for the medical student and the practicing physician, to produce the best kind of family physician.

- Medical practice by teams of physicians rather than solo practitioners in rural areas.

Roy Battles, speaking for the National Grange as well as for other rural people, concluded that now that we have had our health horizons lifted, our personal dimensions of disease prevention and cure broadened, our knowledge of many maladies expanded, we want all the first-class medical services that we have read about.

In delineating the areas of need, he said: "Too many people do not know about or concern themselves with preventive care. Too many rural people are too fat. Too many are involved in accidents. Too many have to wait too long in the doctor's office. Too many communities have their doctors spread too thinly. . . . The same general trend is evident in varying degrees in the case of hospitals, clinics, public health services, nursing homes. . . . Rural people have a long way to go just to catch up to our urban neighbors."

CDC Courses in Insect and Rodent Control

Refresher training in insect and rodent control will be offered at the Communicable Disease Center, Atlanta, Ga., from September 1959 through June 1960, according to the following schedule:

Insect control. September 14-25.

Rodent control. September 28-October 9.

Mosquito control. November 2-6.

Identification and biology of arthropods of public health importance. January 11-22.

Epidemiology and control of vector-borne diseases. February 15-19.

Insect and rodent control. June 6-17.

There are no tuition or laboratory fees for

the courses. Students will be accepted from State and local health departments, the Armed Forces, and other organizations concerned with insect or rodent control. Qualified students from other countries will be accepted and given opportunity to study vectors of important diseases. Applications for any of these courses should be submitted at least a month before the course begins.

Application forms may be obtained from the Chief, Training Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga.

adopted by rural as well as urban families. Rural families can now command to a far greater extent than in the past the services once available chiefly to families in cities.

Still problems persist, and the need continues for a partnership among practicing physicians, rural people, and other groups which can contribute to their solution. Among other problems, this year's National Conference on Rural Health emphasized aging, mental health, and dental health.

Aging

Problems of the aging represent a growing challenge to rural communities, many of which have a disproportionate share of their population in the older age brackets. As a first step toward meeting the needs of the aging, Aubrey Gates, field director of the Rural Health Council, suggested making an inventory of a community's assets in the form of its elder citizens. How many are there? What knowledge and skills do they have of value to their community? How can these continue to be used?

He called for community action to employ the skills of the aged productively, to consider and provide for the needs of older people for housing and recreation opportunities, to plan for the building and maintenance of safer, more modern facilities for care of those who cannot remain at home, and to plan for better home care and visiting nurse service for those whose disabilities require outside assistance although care away from their own homes is not necessary.

Local churches and other organized community groups can help to stimulate and conduct programs to keep the aged an integral part of community life, and to stimulate and advise other groups having responsibility for meeting the health needs of the aged. Rural families can participate in such activities and lead in their development.

Other conference speakers emphasized what people can do for themselves throughout their lives that will help to prevent or alleviate problems of age. Planning in youth and in the middle years can avoid some of the economic as well as the physical and emotional hazards that beset later years. Preparation for senior

citizenship should include attention to proper diet and exercise, cultivation of interests outside the job, and regular physical checkups to detect and treat disease while recuperative powers are still high.

Mental Health

The need for a change in public expectations regarding mental hospitals was discussed by Dr. Prescott Thompson of the Menninger Clinic at Topeka, Kans. In the past, these hospitals were, in fact, asylums in which the mentally ill were doomed to spend their lives, separated from society and with no hope for rehabilitation to restore their capacity for normal living. Now an increasing number of former mental patients are returning to normal lives in their own families and communities. In many cases, local attitudes make such a return difficult, since these attitudes are still based on the old concept of a mental hospital as an asylum where those who enter have no chance to recover from illness.

Some communities have recognized the serious national shortage of trained people for community mental health programs. They have sponsored institutes for ministers, school guidance personnel, and others in a position to provide mental health counseling to local people.

Dental Health

Mrs. E. Arthur Underwood, a practicing dentist of Vancouver, Wash., suggested taking a child to the dentist early as a way to help the child feel that the dentist is his friend, not a person to fear. Parents' attitudes also influence a child's attitude toward the dentist. Frequent visits to the dentist are needed even at an early age to have cavities filled, to prevent further spread of dental disease, and to remove accumulated tartar.

Protection against decay is possible at home through substituting fruit, carrots, and celery, and other low carbohydrate foods for cookies and candy for afterschool snacks. Adequate brushing of teeth will help to remove the food residue that is necessary for bacteria to flourish.

Going beyond action by the individual and family, fluoride in drinking water was pointed

different wards and placed in a convalescent cottage where the professional staff could give them close attention.

The doctors concluded that 55 of these 72 patients were well enough, after intensive treatment, to leave the hospital if they had the incentive to do so and a suitable home to go to. For some it was too late—they had lived at the hospital so long that it was home to them and they did not want to leave. But 26 of the 72 did leave, and all but one of these got jobs and became self-supporting.

To keep such persons in mental hospitals all their lives is not only to fail in a duty of common humanity but it is false economy. Let us say that it would have cost \$1,500 a year, the national average, to maintain these 25 patients in the hospital for the rest of their lives and that they had an average life expectancy of 20 years. This would amount to a total cost of \$750,000—three quarters of a million dollars to maintain in a mental institution for the remainder of their lives 25 men who proved to be perfectly capable of becoming productive members of society.

Similar evidence that large numbers of patients in mental hospitals today need not be there was produced in a study supported by the National Institute of Mental Health at a hospital in California. In this study, 235 long-term patients were given intensive treatment and their record of improvement compared to that of a matched control group. The recovery rate among the special treatment patients was $2\frac{1}{2}$ times that of patients in the control group.

It must be recognized, of course, that it is not easy for a former mental patient to make the transition from hospital to community life. One of the greatest difficulties in making the transition has to do with earning a living. Here there are positive barriers, far more formidable ones than those which many employers put up against hiring the physically handicapped.

A great deal more needs to be done to pave the way for employment of former mental patients, an area that does not require large outlays of money but the priceless ingredients of public compassion and understanding.

The Department of Health, Education, and Welfare, I am happy to report, has been qui-

etly working on this aspect of the problem as an employer. Several persons who have been patients at St. Elizabeths Hospital are employed right now in various agencies of the Department and are doing very well.

These patients were started in carefully selected jobs, working at the Department during the day and returning to St. Elizabeths at night. Nearly all of these patients have gone on from these especially selected positions to regular employment either in the Department or in private industry.

Statistically, of course, this program is not significant. Altogether only about two dozen patients have been involved so far. But the success of this program, it seems to me, should have great significance for all employers.

I think everyone would agree that much could be accomplished if industry, large and small business, public and voluntary agencies, and others concerned applied effort and time toward breaking down the barriers to employment of former mental patients.

There are also large numbers of patients in mental hospitals today who, although not employable, could be cared for much more satisfactorily outside the hospital.

The traditional idea of caring for all mentally ill people in one big institution, regardless of the type or severity of their illness, is being seriously questioned by competent authorities as an effective means of dealing with this vast and complex problem. There are, for example, thousands of elderly people in mental hospitals who could be cared for much better in nursing homes or other facilities more suited to their needs.

A concerted movement in this one direction alone would greatly reduce overcrowding of mental hospitals and the heavy burdens now imposed on limited hospital staffs.

The National Institute of Mental Health provides advisory services and matches State funds to help communities build facilities and provide services for such people. The Institute also offers mental health project grants specifically designed to support projects for the development of new and improved methods of care and treatment for mental patients.

A fully effective attack on mental illness requires not only greater effort to get people out

STATEMENT

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, April 20, 1959*

Care of Mental Patients

TENS of thousands of mentally ill patients in our Nation today are receiving disgracefully inadequate care and treatment.

While there has been some encouraging progress against mental illness in recent years, the situation as a whole is one that I believe the American people would find genuinely shocking if they knew the facts.

I recognize that this is an immensely difficult problem, aggravated by too little scientific knowledge and to a considerable extent, even today, by old fears and superstitions.

One thing, however, is clear: The resources we are devoting to mental illness today fall dreadfully short of meeting the problem. We have not yet mounted an effective attack on mental illness in this country. The fact is, we are barely holding the line.

One does not need to dig very deep into this problem to uncover some shocking deficiencies. I am satisfied that, on the whole, we are beginning to make real progress in the area of research. But in the area of hospital care and treatment, we are far behind.

Many of the 277 State and county mental hospitals in this country are still little more than custodial institutions with wholly inadequate funds, personnel, and facilities for even the simplest methods of treatment.

For the Nation's public mental institutions—where about 9 out of 10 of those in mental hospitals are today—the average expenditure for both care and treatment is only \$4.07 per patient per day. When we compare this with the average cost of \$26 per patient per day in general hospitals, exclusive of physicians' fees, we get some idea of what the great majority of

patients in public mental institutions are up against.

The average expenditure of \$4.07 per patient per day in public mental institutions becomes even grimmer when we take into account the fact that most mental hospitals today devote their best facilities and personnel to the treatment of newly admitted patients whose chances of recovery are greatest.

Today, a patient entering a mental hospital has a 50-50 chance of getting out during the first year. After the first year, however, with the resources currently available, the chances of recovery decline sharply. If a patient does not respond to intensive treatment during the first few months, he must be shifted to the chronic wards in order to make room for new admissions.

Patients who do not get well the first year now have only 1 chance in 5 of ever leaving the hospital and after 5 years only 1 chance in 100.

I am advised, however, that the condition of the longer term patients is by no means as hopeless as the statistics would suggest, that a great many of them could be restored to normal, productive lives if adequate treatment were available. Surely a far greater effort than is possible with the resources available today is needed to rehabilitate the longer term patients—the forgotten men and women of the back wards of our mental institutions.

That this would be a fruitful expenditure of time and effort was proved rather dramatically by a study at a Maryland State hospital. In this project, 72 men patients, all of whom had been in the hospital for more than 5 years and some for more than 10 years, were taken from

Federal Publications

Swimming Pools. Disease control through proper design and operation. *PHS Publication No. 665; 1959; by Jerrold M. Micheal; 147 pages; 75 cents.*

Design, construction, operation, and maintenance of swimming pools and the effect of each on disease control practices are discussed. Prepared as a training and reference guide for use by the Communicable Disease Center in its courses for public health personnel, this manual is intended also for use in State and local inservice training programs.

Swimming. *PHS Publication No. 98 (Health Information Series No. 7); revised 1959; leaflet; 5 cents, \$2 per 100.* Cautions swimmers against overexertion, and warns of unseen dangers. Emphasizes safe practices.

Municipal Water Facilities. Communities of 25,000 population and over, continental United States and territorial possessions, as of January 1, 1958. *PHS Publication No. 661; 1959; 83 pages.*

Changes which have occurred in the organized community water facilities of approximately 850 municipalities since 1956 are reflected in this inventory. Directed to industries, other private agencies, and all levels of government, the report should be useful in planning for broad water developments, industrial expansion, and national emergencies.

Health Statistics From the U.S. National Health Survey. Persons injured, by class of accident, United States, July 1957-June 1958. *PHS Publication No. 584-B8; 1959; 62 pages; 40 cents.*

This report adds information to that already published from the health survey on class of accident and on age, sex, and urban-rural residence of persons injured. The tables cross-classify characteristics of the population with medical attention and activity restriction result-

ing from injuries. They also relate the persons injured to income level and to major activities of working, keeping house, retirement, and school attendance.

Appendixes carry technical notes on methods, give definitions of terms, and show the content of the questionnaire used to collect the information.

National Water Quality Network. Annual compilation of data, October 1, 1957-November 30, 1958. *PHS Publication No. 663; 1958; 239 pages; \$1.50.*

Approximately a dozen chemical determinations and data on coliforms, plankton, organic materials extracted by activated carbon, and radioactivity are set forth in this first annual report following establishment of the water quality network.

The raw data, presented chronologically, were obtained from about 50 sampling stations set up by the Public Health Service and operated cooperatively with local and State agencies. Statistical and other analyses of the data will be published separately.

Psychopharmaca. A bibliography of psychopharmacology, 1952-57. *PHS Publication No. 581 (Public Health Bibliography Series No. 19); 1958; by Anne E. Caldwell; 258 pages; \$1.50.*

Approximately 2,500 articles dealing with psychopharmaca, defined as drugs that primarily affect the mental state, are indexed in a subject list of drugs and again in an author list. The articles are concerned with the effects on psychological, behavioral, and encephalographic reactions of normal subjects, patients, and laboratory animals. They were published between January 1952 and December 1956, with a partial listing for 1957.

To aid the user in locating entries in the subject list, a drug index lists chemical, code, trade, and generic names of drugs, names of drug

groups, trade names of drug combinations, and terms for special therapeutic and research techniques. An ancillary subject list of special conditions contains articles referring to the aged, alcoholism, children, and pain.

Viral Hepatitis. Clinical and public health aspects. *PHS Publication No. 435; revised 1959; by Heinz Eichenwald and James W. Mosley; 56 pages; 20 cents.*

Directed to public health workers and physicians, this manual contains comprehensive discussions of the diagnosis, prevention, and treatment of hepatitis, and of the role of the health department during an epidemic. Appendixes outline information applicable to the operation of mass inoculation clinics, procedures to be employed in an epidemic area, and forms useful in obtaining family and case histories.

Budget Payment Plan of the Nevada State Dental Society. *PHS Publication No. 651; 1959; 18 pages.*

A dental postpayment plan is analyzed to ascertain characteristics of the people who obtain loans to purchase dental care and the nature of the care they purchase.

Sex, age, occupation, family income, and number of persons covered by notes are included in the study of characteristics of the borrower. Frequency of occurrence and expenditures are shown for the various types of dental service provided.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

of mental hospitals but also much greater effort to keep mental and emotional disorders from developing to the point where a mental hospital is the only answer. For this we need many more clinics and other outpatient facilities for the less seriously disturbed and more day-care centers and psychiatric units in general hospitals for those whose conditions require more extensive treatment.

The consensus of those with whom I have discussed this problem appears to be that one of the greatest potentials in the whole field of mental illness lies in earlier diagnosis and earlier intensive treatment.

In this connection, the National Institute of Mental Health is supporting a study to determine the feasibility of incorporating protection against mental illness in voluntary health insurance programs. Such a development, I am convinced, would go a long way toward encouraging people with incipient mental or emotional disorders to obtain competent professional advice and assistance before their ailments reached a serious stage. There have been several instances, I understand, where a few ounces of prevention in the form of intensive early treatment have worked wonders with persons who in the normal course of things probably would have landed in mental institutions.

The great need today is for more professionally trained personnel in all fields of mental health.

The American Psychiatric Association in December 1957 published results of a study of professional staff in public mental hospitals as of 1956. This study shows that the number of physicians, psychologists, registered nurses and other nurses, and attendants was grossly inadequate.

The minimum APA recommendations for physicians in mental hospitals is 1 to every 94 to 98 patients. The actual ratio in 1956 was 1 physician to every 184 patients, or a shortage of 55 percent.

The recommended ratio of clinical psychologists is 1 to every 400 to 500 patients. The actual ratio of 1 psychologist to every 769 represents a shortage of over 35 percent.

The recommended ratio of registered nurses is 1 to every 15 patients. The actual ratio of 1 registered nurse to every 77 patients in 1956 represented a shortage of over 80 percent.

The APA recommends that in addition there be one other staff member (nurse or attendant) to every five patients. The actual ratio of one to every seven patients in 1956 represented a shortage of about 25 percent.

Because of these shortages, I am told that the potentials inherent in the new tranquilizing drugs are as yet largely unrealized. These drugs do not cure mental illness. They are effective in calming disturbed patients to the point where they can be reached with treatment. If the treatment is not available, the effect of the drugs is lost.

WHO Publications

Medical Education. Annotated bibliography, 1946-1955. 1958; 391 pages; \$6.75.

First Report of the Expert Committee on Water Fluoridation. WHO Technical Report Series No. 146; 1958; 25 pages; 30 cents.

Post-Graduate Training in the Public Health Aspects of Nuclear Energy. Fourth report of the Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel. WHO Technical Report Series No. 154; 1958; 53 pages; 60 cents.

These publications may be obtained in the United States, directly or through a bookseller, from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.

The Federal Role in the Nation's Health

ELLIOT L. RICHARDSON

WITH THE EXCEPTION of a flurry of health activities during and after World War I, the Federal Government played a very limited role in family and community health until the thirties. During the First World War, for example, the Public Health Service was authorized to provide extra-cantonment sanitation activities and to inaugurate a venereal disease control program. And when the disastrous influenza pandemic hit the United States in 1918-19, Congress appropriated \$1 million to the Public Health Service to help suppress this disease.

In the postwar period Federal health activities languished. Then the great depression of the early thirties brought the Social Security Act, which prepared the way for wider Federal participation in public health activities. A substantial program of grants-in-aid to the States for general public health purposes was authorized. Later, specialized programs for tuberculosis and venereal disease control were added.

Despite these measures, the Federal investment in public health and medical research was quite meager until World War II. In 1940, for example, a year in which the Federal budget was \$6.2 billion, only \$3 million was spent for medical research and an additional \$19 million for all other health purposes, including grants to the States.

At the onset of World War II, with the mass tragedy of 1918's influenza pandemic far from forgotten, there emerged a realization of the

vital roles that individual and collective health could and would play in the national security. In the early days of World War II the Federal Government quickly recognized that a healthy citizenry was vital to winning the war and that bold approaches to the prevention and cure of disease must have stimulus as well as supplementary financial support.

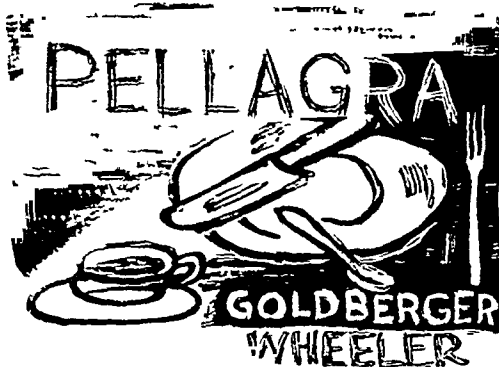
In consequence, the now widely used cooperative approach to medical research was evolved by universities, foundations, industries, and government at local, State, and Federal levels—a pattern that deserves to flourish for a long time to come.

I need not recount the dramatic medical achievements that have resulted from this cooperative approach to research during the past decade and a half. Never before in history has there been such an extraordinary accumulation of new medical knowledge and such a swift advance in technical methods and skills for the application of that knowledge.

As a result, we now have in America a citizenry that is keenly interested in health and generally aware of what is available in medicine. The citizen, the consumer of the medical product, not only expects medical science to go forward at even a faster pace but also insists that the products, techniques, and skills that derive from current achievements be readily accessible to all who need them. Indeed, today the Federal Government is expected to be responsive, to a degree unknown in any former time, to inexorable demands for medical and public health services which no single group acting alone could ever provide and which all groups in concert can barely meet.

At almost every point in the spectrum which has at one end the development of new knowl-

Mr. Richardson, Assistant Secretary of Health, Education, and Welfare, delivered this address May 5, 1959, at the centennial meeting of the Kansas State Medical Society in Topeka, Kans.



EXPERIMENTAL PELLAGRA IN THE HUMAN SUBJECT BROUGHT ABOUT BY A RESTRICTED DIET.

By JOSEPH GOLDBERGER Surgeon, and G. A. WHEELER, Assistant Surgeon, United States Public Health Service

In this communication we present a brief outline, with the results, of an experiment planned to test the possibility of producing pellagra in the healthy human, white, adult male, by a restricted, one-sided, mainly carbohydrate (cereal) diet.

The experiment was carried out at the farm of the Mississippi State Penitentiary, about 8 miles east of Jackson, Miss. At about the center of this farm of some 3,200 acres, well isolated from the surrounding communities is the "camp," consisting of a group of frame buildings, including the cottages of the officials, the "cage," "new hospital," barns, stables, etc. Dr. A. G. McLaurin, the prison physician, informs us that there is no history of the occurrence or presence of pellagra on this farm.

During the period of the experiment there have been quartered at this "camp" an average of between 70 and 80 convicts, all white males. Included in this number were 12 who, accepting the offer of a pardon made them by Gov. Brewer and with the assurance of proper care and treatment should such be needed, volunteered to submit themselves to the experiment. White adult males were selected because, judged by the incidence in the population at large, these would seem to be least susceptible to the disease.

Experiment.

The volunteer squad of 12 men was organized between February 1 and February 4, 1915. On July 1, 1915, one of the volunteers was released because of the development of a prostaticitis. This left 11 men in the squad, 24 to 50 years of age, who have remained in the test, on the prescribed diet, to its termination, October 31, 1915. These men were quartered in the so-called "new hospital building," a small, screened, one-storied cottage, about 500 feet from the "cage" in which the other convicts were domiciled. This cottage had previously been used as the quarters for the "assistant sergeant" of the "camp." From the time of its organization this squad was strictly segregated and under guard day and night.

NOVEMBER 12, 1915, pp. 3336-3339

Dr. Goldberger and Dr. G. A. Wheeler produced pellagra in 6 of 11 men by restricting their diet mainly to carbohydrates. Later, with Sydenstricker (*Public Health Reports*, March 19, 1929, pp. 648-713), they showed a relationship between pellagra and diet lacking in milk and fresh meat.

Apart from their significance in establishing long-range goals, these studies have reinforced our firm belief that research, education, and training are inherently inseparable and that a successful research and training effort for the Nation as a whole must be securely grounded upon a sound educational base. For this reason we are more concerned than ever about the urgency of immediate steps to correct the imbalance between medical research and education that has tended to result from the very magnitude of Federal research expenditures.

Our analysis has, for example, confirmed the view that the National Institutes of Health should pay not only the direct costs of any research project which they support but should also pay whatever share of indirect costs, such as administrative salaries, heat, light and power, and maintenance of buildings, is fairly attributable to that project. Until this is done, each new project undertaken by a medical school will result in an additional drain on its operating funds, thereby weakening its capacity to carry out its teaching mission. Similarly, hospital care will suffer from the diversion of uncommitted income to the support of research. We propose, therefore, at the earliest opportunity, to renew the fight to eliminate the limitation on the payment of indirect costs which for a number of years has been contained in our appropriations acts.

A related problem concerns the very considerable number of medical school and hospital personnel whose salaries are being paid in full or in part out of research grant funds. Under existing law no assurance can be given that such funds will continue to be provided in predictable amounts. The result is that no security of tenure and no firm career ladder in medical research can be offered to the men and women engaged in such projects.

To remedy this and at the same time to make possible a degree of flexibility in the allocation of research funds with a minimum of red tape, we have under consideration recommendations for legislation that would authorize the allotment to the research institution of a percentage of total research appropriations on an "institutional grant" basis. To the extent, in other words, of say 15 percent of such appropriations, we would make allotments among re-

search institutions in a manner that would not require specific project applications and that would enable them to utilize the funds for the continuing work of their senior investigators.

Grants for Professional Training

In conjunction with its projection of future expenditures for medical research, the Bayne-Jones Report warned that the present shortages of professional and technical manpower are likely to grow even more critical as research demands increase. Larger numbers of well-trained professional people are going to be needed not only to conduct the search for new knowledge but to bring this knowledge to our rapidly expanding population in the form of better medical care. Speaking to the latter point, the Bayne-Jones group predicted, "A minimum of 14 or as many as 20 new medical schools will have to be built (by 1970) if the existing number of physicians per 100,000 population is not to fall."

The Public Health Service, with the help of a new advisory group headed by Frank Bane, former executive director of the Council of State Governments, is now systematically studying the whole question of the need for physicians and exploring the ways in which this need may be met. This study, together with the National Institutes of Health study of 20 medical schools and the Bayne-Jones Report, should provide a strong basis on which to develop national goals for medical education and research.

The Federal Government, meanwhile, is already making significant contributions toward the reduction of manpower shortages in the health field. The National Institutes of Health of the Public Health Service, for example, will spend in 1959 more than \$60 million in stipends for individuals preparing for careers in medical research, for the support of traineeships for persons intending to become specialists in one of the fields covered by a categorical institute, in grants to teaching institutions for the support of training courses, and for research fellowships. In addition, the Public Health Service is spending \$57 million for training in water pollution control activities, advanced nursing, and other public health responsibilities.

edge in the health field and at the other the financing of medical care, the Federal Government has already assumed some degree of responsibility. That responsibility now includes participation with official and voluntary State and local agencies in the formulation of research policies in particular areas; the support of that research; aid to professional and technical education and training; assistance in the construction of new facilities and the renovation of old; help in the prevention and control of disease; consultation and funds to help institutions to effect the most fruitful utilization of scientific and teaching faculties; financial aid to improve and expand institutions devoted to research and treatment; and finally, cooperation in strengthening and complementing private and public systems of financing medical care.

We cannot, therefore—even if we were inclined to do so—start from scratch in attempting to frame legislation designed to strengthen the capacity of the Federal Government to assist in dealing with the health problems of today and tomorrow. As we see it, our function is to take such additional action as may be necessary in a manner that will so far as possible preserve and strengthen the pattern of Federal, State, local, and private cooperation that has worked so well in the past. My aim will thus be to show how we in the Department of Health, Education, and Welfare are attempting to apply this approach to the problems in the field of health that seem to us most urgent. In so doing, I shall start with medical research, proceed from there to the needs of medical schools and related teaching institutions, describe our present thinking with regard to medical care facilities, and conclude by touching briefly on the financing of medical care.

Medical Research

Amid all the vast array of urgently needed health, education, and welfare activities, medical research today occupies a favored position. It is the only one of which the sole question asked is, How much can usefully be spent? Although expenditures for medical research still represent only about 4 percent of the Nation's total investment in research and development, such expenditures have more than doubled in

the last 5 years. The Federal Government's share, meanwhile, has gone up by almost 300 percent.

This phenomenal growth in the support of medical science has, of course, been fed by the very achievements of medical science. Each new discovery reinforces the public demand for still faster progress in the conquest of the cripples and killers that are mankind's most ancient enemies. The consequences, however, for medical education and for the private agencies and organizations actively concerned with medical research, as well as for Government, are so significant and far-reaching as to cry out for careful study and evaluation. To make such a study, former Secretary of Health, Education, and Welfare Marion B. Folsom in 1957 appointed a committee of distinguished consultants under the chairmanship of Dr. Stanhope Bayne-Jones, formerly dean of the Yale University School of Medicine and technical director of research, Office of the Surgeon General of the Army. The committee presented its report, now generally referred to as the Bayne-Jones Report, in June 1958.

Over the past 4 months Secretary Flemming has devoted considerable time with the Surgeon General of the Public Health Service and the director of the National Institutes of Health, Public Health Service, and their staffs, to studying the full implications of this report. He has also reviewed the data obtained from a supplementary study of 20 medical schools conducted by the National Institutes of Health.

On the basis of these data it has been possible to project the probable rate of growth in expenditures for medical research and to formulate as a long-range national goal for such research a total annual expenditure of \$1 billion by 1967. We assume, as a guide for national action, that the support of medical research should continue to be divided almost equally between Federal and non-Federal sources. It is expected, moreover, that the present pattern of support within the Federal Government will be generally maintained, with the National Institutes of Health providing most of the Federal share. This would mean an increase in National Institutes of Health expenditures for research from \$209 million in fiscal 1959 to an annual rate of about \$350 million by 1967.

wartime deferment of construction and now because of the population boom, that the Federal Government has for more than 10 years been playing a major part in a nationwide cooperative program designed to meet this need. The Hill-Burton Act, which created the hospital survey and construction program in 1948, has been a tremendous success, particularly in building general hospitals. And yet most of the gain in new beds has been offset by increases in population, by obsolescence, and by the abandonment of old facilities as new facilities are constructed. Like Alice and the Red Queen, we have had to run like blazes to stay in the same place.

Eleven years ago we had about 60 percent of the general hospital beds we needed. Today, with the help of almost \$1 billion in Federal funds and more than \$2 billion in State, local, and private matching funds, 75 percent of the need for general hospital beds has been met. In addition, we now have 73 percent of the tuberculosis beds needed, as compared with 46 percent in 1948. In mental hospital beds we have slipped from 55 percent of the need in 1948 to 53 percent today. All in all, State plans show a remaining deficit of 888,000 hospital beds of all types and 323,000 nursing home beds.

An equally pressing problem has been the rapid upward spiral in the costs of hospital care, more than 179 percent in a decade. The search for means of combating this rise has been a central purpose in the allocation of research and demonstration project funds—\$1,200,000 annually—under the Hill-Burton program. In our view, the results of experimentation in "progressive patient care" are particularly promising. This is a pattern of services making use both of physical facilities and of medical and nursing personnel in the manner best suited to the needs of the individual patient. It includes intensive care for critically ill patients, intermediate care for those requiring a moderate amount of service, self-care in a hotel type of setting for ambulatory patients, and long-term care for the chronically ill in a homelike atmosphere with periodic evaluation of progress and rehabilitation.

Concern with the high cost of hospitalization

also underlies much of our recent thinking with respect to improvements in the Hill-Burton program. In this connection we are laying particular stress on finding ways and means of making the diagnostic and treatment center category of the program more useful. As the Hill-Burton Act now stands, we can make grants for the construction of such centers only where the center is formally affiliated with a hospital. Although we have considered asking for the complete elimination of this requirement, our present view is that it should be removed only for mental health clinics and diagnostic and treatment centers in remote areas.

The limitations of the Hill-Burton Act, however, are not the major barrier to the construction of more facilities for outpatient services. More important is the lack of readily available insurance against the cost of out-of-hospital care and treatment. It is heartening, therefore, that the health insurance industry has this problem under intensive study and has already taken a number of experimental steps toward providing such insurance. In addition to major medical expense insurance, which from its inception has been applicable to the costs of medical care wherever it may be provided, many insurance companies as well as Blue Shield plans now offer coverage against the costs of physicians' services in the home or office. In the meanwhile, we are continuing to search for ways of encouraging faster progress in this direction.

So far as facilities for acute care are concerned, the principal contribution of the Hill-Burton program has been toward the construction of new hospitals. Rural communities altogether lacking in hospital beds have been the chief beneficiaries. Needed in addition, however, is some form of assistance in financing the cost of repair and modernization of existing hospitals in urban areas. Several approaches to meeting this need are possible: earmarked grants, direct low-interest loans, mortgage insurance, or some combination of the three. These approaches are all under study in the Department. In addition, we believe that we should continue to emphasize the importance of experimentation in measures designed to reduce the cost of hospitalization. For this purpose we are considering the merits of expand-

Assistance to Research and Training Institutions

All these programs—research grants, traineeships, fellowships, even training grants—amount in effect, so far as the research or teaching institution is concerned, to payments for the purchase or reimbursement of services. To the extent that such payments are applied to activities that the institution would in any case feel bound to undertake—and certainly a medical school would be obliged to support a certain amount of research even if no Federal grant program existed—they can of course be regarded as aid to the institution. Yet it is equally clear that the research and research-related training programs now being carried out are much larger in volume and different in character than they would be if Federal funds were not available. Indeed, the programs would not be serving their purposes if this were not the case, for they were not designed primarily for the assistance of institutions. Frequently, in fact, as I have tried to make clear in discussing the need for the full payment of indirect costs and for institutional grants, the programs operate as burdens on the institution.

We cannot escape, therefore, the obligation to face squarely the need for more direct forms of Federal assistance to health training and research institutions. For medical schools, dental schools, and schools of public health, particularly, this need is becoming increasingly acute. As President Eisenhower stated in addressing the National Fund for Medical Education a year and a half ago:

The rapid accumulation of new medical knowledge is flooding in like a tide in the Bay of Fundy. There is on all sides a mounting demand for health services by our communities. Under these demands, the medical schools in America today face inherited responsibilities beyond what they are financially able to meet. The medical progress of which we are so justly proud has involved these teaching institutions in a struggle for solvency and survival.

The constantly widening scope and complexity of medical education has, within the space of a few decades, quadrupled the cost of producing a qualified doctor. Tuition now pays but one-fifth of the student's total education cost.

Accordingly, there is—today—a great gap to close: the gap between the ceiling of medical school receipts from all sources and the racing increase in costs of teaching, research, and medical care.

Under present law the only Federal program

that provides direct help to medical schools and kindred institutions is the program of matching funds for the construction of research facilities. First enacted in 1956 and extended in 1958 until 1961; this program authorizes expenditures up to \$30 million a year for buildings used in the actual conduct of research, or for that part of a building to be devoted to research, but not for buildings or parts of buildings used for teaching or administration. Although authority to make grants for the latter purpose has been advocated by the Administration in each of the last 3 years, Congress has not yet seen fit to grant it. Budgetary considerations permitting, we shall probably try again. Next time, however, we may modify our earlier proposals by suggesting that grants be restricted to buildings needed in order to expand enrollments or to prevent their reduction.

So far as outright Federal grants for operating purposes are concerned, the only beneficiaries at the present time are the 11 schools of public health. In recognition of the fact that most of their graduates enter public service, Congress passed a bill in 1958 authorizing grants to these schools in an aggregate amount of \$1 million a year. The act was limited to 2 years in duration and therefore expires in 1960. Assuming that it is to be extended, should it be confined to the schools of public health, be modified so as to restrict it to the support of special projects in public health training, or be expanded to include other types of teaching institutions in the health field? Should its significance as a precedent, in other words, be ignored, brought more nearly into line with the National Institutes of Health training grant programs, or extended? Most of us in the Department of Health, Education, and Welfare, especially those of us who have been wrestling with the needs of higher education as a whole, would hesitate long before recommending simple extension.

Aid to Institutions Providing Patient Care

New weapons in the war against disease and training in their use are of little avail if we lack the facilities in which to employ them in caring for the sick. So great has been the need for such facilities, first as a result of the

average medical care needs. As a group they use about two and a half times as much general hospital care as the average for persons under age 65, and they have special need for long-term institutional care. Their incomes are generally considerably lower than those of the rest of the population, and in many cases are either fixed or declining in amount. They have less opportunity than employed persons to spread the cost burden through health insurance. A larger proportion of the aged than of other persons must turn to public assistance for payment of their medical bills or rely on "free" care from hospitals and physicians. Because both the number and proportion of older persons in the population are increasing, a satisfactory solution to the problem of paying for adequate medical care for the aged will become more rather than less important.

In our society the existence of a problem does not necessarily indicate that action by the Federal Government is desirable. The basic question is: Should the Federal Government at this time undertake a new program to help pay the costs of hospital or medical care for the aged, or should it wait and see how effectively private health insurance can be expanded to provide the needed protection for older persons?

The report itself does not attempt to answer this question, although it sets forth the arguments on both sides. Building on the data contained in the report, we are now trying to develop an answer. It is not an easy task, and I would not venture to predict where we will come out. One thing, however, is sure: before reaching any final conclusion we will seek opportunities for consultation with representatives of the medical profession and other interested groups. This approach has helped to solve many health problems in the past, and we are confident that it will lead us to a sound solution of this one also.

As the President has eloquently declared:

A healthy citizenry is the first defense line of the Republic. A healthy citizenry is capable, in peacetime, of expanding our economy; in times of critical tension, of carrying on without cracking or growing hysterical; in times of conflict, of showing the endurance and stamina upon which victories are built.

Salaries of Local Public Health Workers

Salaries of local public health workers continued to increase between 1954 and 1958, but at a progressively lower rate than in the previous 2 years, according to the latest survey. The study, the sixth since 1948, was sponsored by the Public Health Service, the American Public Health Association, the Association of State and Territorial Health Officers, and the National League for Nursing.

Except for dentists and some sanitation personnel, the increase in median salaries from 1954 to 1958 ranged from 13 percent to 24 percent in local health units serving populations of 50,000 to 249,999.

The highest rate of increase for 6 of the 12 occupational groups studied—local health officers (medical), sanitary engineers, other sanitation personnel, professional laboratory workers, clinic nurses, and staff public health nurses—was in health units serving popula-

tions of 250,000 to 499,999. For the other six groups—other public health physicians, dentists, sanitarians, veterinarians, health educators, and supervising public health nurses—the highest rate of increase was in units serving populations of 500,000 and over.

The rates of salary increases were less uniform in the largest health units than in the smallest.

Data for 10-year comparisons are available for units in the 50,000-to-249,999 population class. Since 1948, the greatest increase, 74 percent, has been for local health officers and the next greatest, 73 percent, for sanitary engineers. No decrease was recorded for any category of public health workers.

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ing the research and demonstration authority of the Hill-Burton program so as to provide for direct grants—grants, in other words, not included in State allotments—for the building of experimental structures.

One other amendment to the Hill-Burton program that we expect to propose is motivated both by the aim of avoiding unnecessary hospitalization in high-cost institutions and by awareness of the continuing increase in the number of the aged. This amendment would consolidate the chronic-disease hospital and nursing-home categories of the program into a new "long-term care facilities" category and increase the authorized appropriations for this category. For similar reasons we also support the provision in the pending housing bill of mortgage insurance for proprietary nursing-home construction, with assurance through State licensing agencies of adequate standards of care.

Disease Prevention Programs

Disease prevention programs are fundamental activities of the Public Health Service in cooperation with State and local health departments. Although the acute communicable diseases have declined in prevalence, keeping them under control requires unrelenting vigilance. Yet the very success of public health techniques in curbing the acute contagions has been accompanied by a steady rise in the chronic diseases, especially those of the heart and arteries, cancer, diabetes, and the debilitating disorders peculiar to old age. Research and epidemiological investigations into their causes, incidence, and cure are being conducted on a wide scale. So far as prevention is concerned, the greatest unmet need is in health education. Our efforts in this direction need intensification, and, if possible, the application of more vigor and imagination.

High priority among preventive health activities must also be given to the problem of maintaining a healthful physical environment. Modern technology, urban growth, and industrialization are daily making this problem more acute. Water pollution, waste disposal, food and drug contamination, smoke and smog, and nuclear fallout present hazards to health

whose seriousness is not yet fully known. Radiation hazards in particular demand a comprehensive approach, and the Budget Bureau now has under study the relative responsibilities of the Public Health Service and the Atomic Energy Commission in this field. In addition, we in the Department of Health, Education, and Welfare are considering the possible need for some form of assistance to the States in the exercise of their radiological health responsibilities.

Financing the Costs of Medical Care

Even after new knowledge has been won, doctors have been trained, facilities have been built, and everything possible has been done to prevent disease, there remains the problem of paying for medical care. Although we have reached new heights of prosperity in the United States, medical costs represent a serious problem to many American families. In 1957, for example, about half of all the families in this country had incomes below \$5,000 and one family in seven had an income below \$2,000. As many as one-quarter of all American families today have no cash savings, and in 1958 it was estimated that more than half of our families had savings of less than \$500. For these people the costs of long-term and other disabling illness can be a crushing burden, particularly if the victim is the breadwinner.

For most people voluntary health insurance represents the best means of meeting the costs of medical care. Preliminary estimates for December 1958 show that just over 121 million people, or 70 percent of the population, then had some form of hospital insurance. Ten years earlier, in December 1947, the 53 million persons with such protection represented 37 percent of the total population.

There are, however, serious gaps in coverage of our older citizens, less than half of whom have any kind of health insurance. Summarizing an intensive study of this subject for the House Committee on Ways and Means, the Department of Health, Education, and Welfare last month reported:

There is general agreement that a problem does exist. The rising cost of medical care, and particularly of hospital care, over the past decade has been felt by persons of all ages. Older persons have larger than

average medical care needs. As a group they use about two and a half times as much general hospital care as the average for persons under age 65, and they have special need for long-term institutional care. Their incomes are generally considerably lower than those of the rest of the population, and in many cases are either fixed or declining in amount. They have less opportunity than employed persons to spread the cost burden through health insurance. A larger proportion of the aged than of other persons must turn to public assistance for payment of their medical bills or rely on "free" care from hospitals and physicians. Because both the number and proportion of older persons in the population are increasing, a satisfactory solution to the problem of paying for adequate medical care for the aged will become more rather than less important.

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Snail Inhibitor

Evidence that the algae characeae inhibit the snail host (*Australorbis glabratus*) of schistosomiasis was reported in Brazil, where an estimated 6 million persons are parasitized. Lair Remusat Rennó, professor of botany of the University of Minas Gerais, stated that during 6 years of research, the snails have not been observed in water courses containing the algae characeae (*Chara vulgaris*). After the algae were seeded in heavily infested areas, the snails disappeared within a short time. Research is underway to isolate the property which repels snails.

The findings were reported at the third national seminar of sanitary engineering professors, sponsored by the Ministry of Education, the University of Minas Gerais, Serviço Especial de Saúde Pública, and the U.S. Operations Mission in Brazil, at Belo Horizonte in July 1958.

—E. ROSS JENNEY, M.D., *chief, Health and Sanitation Division, U.S. Operations Mission, Brazil.*

The Early Rains

Last October severe regional outbreaks of malaria occurred in Ethiopia in areas with elevations of 5,000 to 6,500 feet. We received a warning early in June when a malaria survey in the Bahar Dar area, which has an elevation of 6,000 feet, revealed an exceptionally high prevalence of malaria in many villages which ordinarily would be free of the disease until much later in the season. Unusually early rains there had produced large populations of *Anopheles gambiae*.

Checks in some of the epidemic areas showed infections almost exclusively with *Plasmodium falciparum*.

The severity of the epidemics so alarmed some local officials and provincial governors that they appealed to the Emperor for drugs, insecticides, and

medical personnel. Anti-epidemic teams were organized by the Ministry of Health and dispatched to the stricken areas.

—ROBERT D. SHANNON, *acting chief, Health and Sanitation Division, U.S. Operations Mission, Ethiopia.*

Practical Nurses

The new 8-month course for nurse assistants, needed to relieve the shortage of nurses in Vietnam, will be well attended. Two thousand applied for the 60 openings for students in Saigon and 400 for the 40 vacancies in Hue. Half the students selected for the first course were men and half were women. They will wear a blue and white uniform during their training.

We hope that this course, which is similar to the training for practical nurses in the United States, and the new 3-year course for professional nurses will help standardize the classification of this profession into 2 clear-cut groups instead of the present 30 vague and overlapping categories.

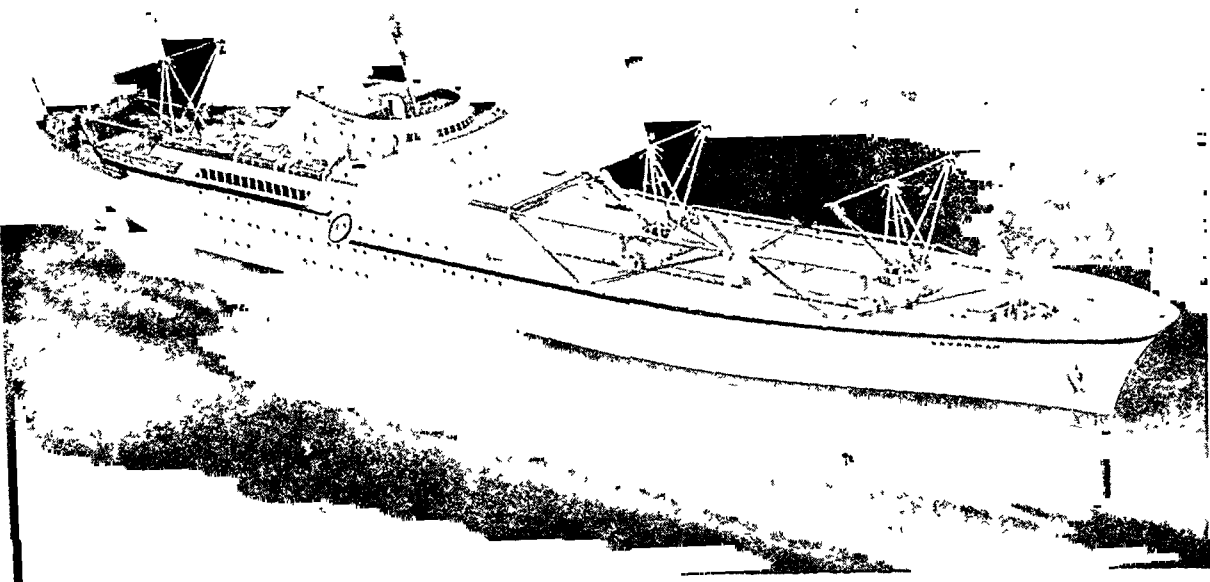
—WILLARD H. BOYNTON, M.D., *chief, Health and Sanitation Division, U.S. Operations Mission, Vietnam.*

Milk and Water

On a visit to an isolated Arawak village, a center for some 500 Amer-Indians living in this area of Surinam, we examined practically all of the infants and toddlers and the 30 school children. Their nutritional status was relatively good because of the powdered milk they receive from UNICEF. Inflammation of the eyes was the only easily recognizable affliction of high prevalence. We were not sure what percentage was trachoma and what follicular conjunctivitis, as both appeared to be present.

The Amer-Indians frequently asked for more ophthalmic ointment for their eyes, but rarely, however, as we toured the area, did anyone mention that the community needed a well. Daily the small children carry to their homes a few buckets of water from a creek 1½ kilometers distant, the nearest year-round source.

—HILDRUS A. POINDEXTER, M.D., *former chief public health physician, U.S. Operations Mission, Surinam.*



Safety on the Nuclear Ship Savannah

RICHARD P. GODWIN, B.S., PRESTON P. EDDY, B.S., and RALPH K. LONGAKER, M.S.

THE LAUNCHING of the *NS Savannah* in July 1959 signaled a major advance in the peaceful application of nuclear energy. Following outfitting, tests, and sea trials, the *Savannah* is expected to enter the sealanes of the world during 1960, powered by a nuclear reactor which will not require refueling for 2 to 3 years. Safety, both nuclear and marine,

Mr. Godwin is assistant director for maritime reactors in the Division of Reactor Development, Atomic Energy Commission, and nuclear projects officer for the Maritime Administration, Department of Commerce. Mr. Eddy is project manager in charge of design, engineering, and construction for the NS Savannah. Mr. Longaker, a sanitary engineer with the Special Projects Branch, Division of Radiological Health, Public Health Service, is now on detail as Public Health Service liaison to the Maritime Administration-Atomic Energy Commission nuclear-powered ships projects.

has been the keynote throughout the project in design and construction and in planning the vessel's operating program.

The nuclear-powered ship is the second *Savannah* to make maritime history. One hundred and forty years ago, a 320-ton wooden ship with all sails set on her three masts and belching smoke from a funnel amidship, commenced an epoch-making voyage from Savannah, Ga., to Liverpool, England. She was the *SS Savannah*, the first vessel to use steam on a transatlantic crossing. The 29-day voyage was successful even though only enough coal and wood could be carried to permit about 80 hours of steaming. Captain Moses Rogers, skipper of the vessel, stopped briefly at Kinsdale, Ireland, to replenish his fuel supply so that he could make a spectacular arrival by steaming up the Mersey River to Liverpool under power. However, the watch in the coastal station at Cape Clear on Ireland's south-

ern tip sighted the *Savannah* with smoke coming from her stack and concluded she was on fire.

The British revenue cutter *Kite* was sent to her relief. To the surprise of the cutter's crew, the *Savannah*, without a sail set, outdistanced them completely. It was not until after the exasperated crew of the *Kite* had fired a shot across the bow of the American vessel that she stopped and gratified their curiosity.

Thus, the *SS Savannah* ushered in the steam age in ocean travel. Today another *Savannah*, bearing the designation "NS," will usher in the atomic age.

Development

On April 25, 1955, President Eisenhower first suggested the construction of a nuclear-powered merchant ship which, visiting the ports of the world, would demonstrate to people everywhere the peacetime use of nuclear energy, harnessed for the improvement of human living.

The following year, Congress passed legislation which made construction of the ship possible, and on October 15, 1956, the program was initiated. A joint group, drawing its members from the Maritime Administration of the Department of Commerce and from the Atomic Energy Commission, was established to administer the program.

Shortly thereafter, the U.S. Coast Guard, the Public Health Service, and other Federal agencies began to assist the nuclear merchant ship program through assignment of liaison personnel and active participants to technical committees dealing with questions and problems which had no precedent. In addition, the Atomic Energy Commission's Advisory Committee on Reactor Safeguards independently reviewed reactor construction and operating procedures with a view toward the safety of the ship's crew and passengers and the public.

The *NS Savannah* was launched on July 21, 1959. Before the beginning of the comprehensive test program, she will require approximately 7 months of dockside outfitting. Sea trials are scheduled to start during the spring of 1960. To staff the vessel, two groups of specially selected licensed merchant marine officers are being trained in a 15-month course

which includes classroom work in reactor theory, operation of the *Savannah* reactor console simulator, and practical experience at other reactor sites such as those at Hanford, Wash., and Arco, Idaho.

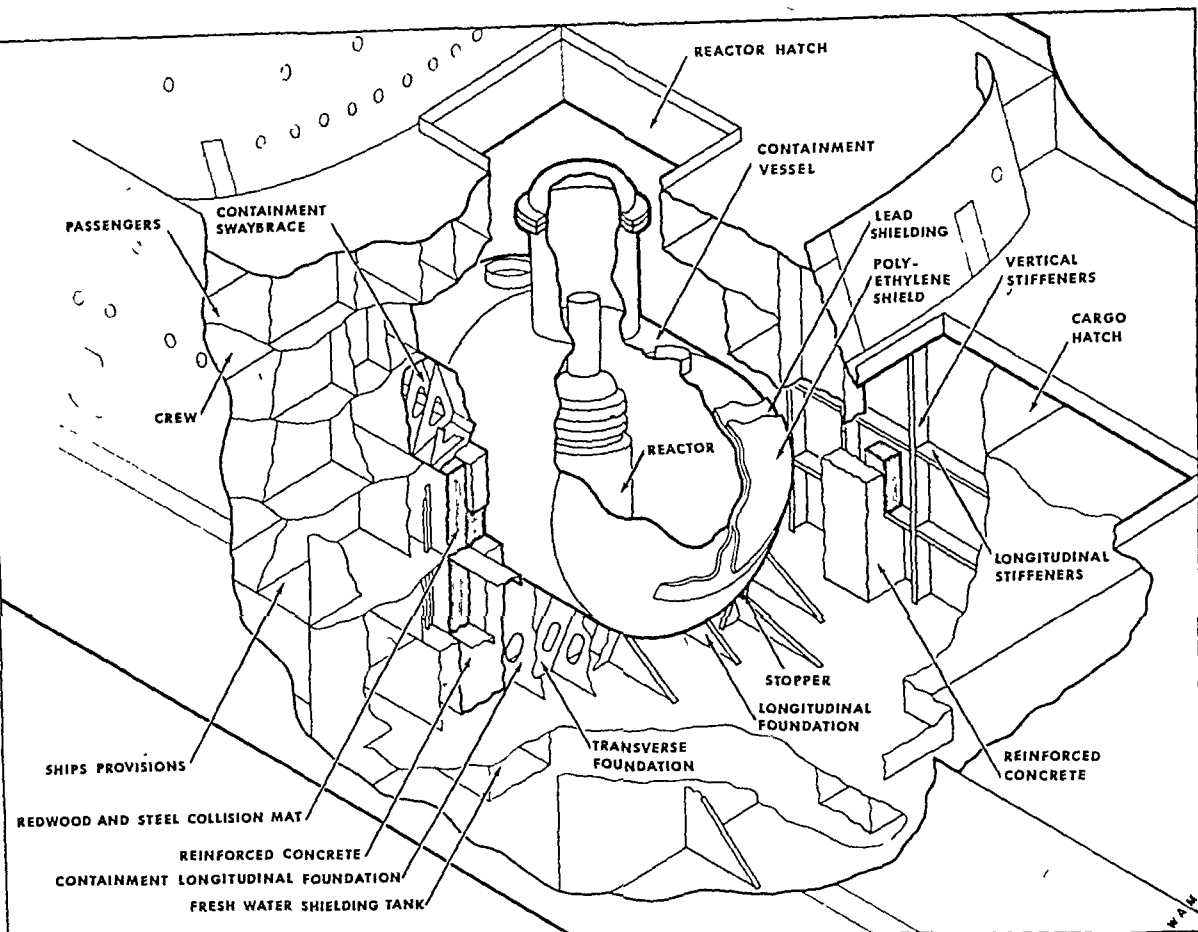
The *NS Savannah* is a combination passenger-cargo ship of the Mariner class. It is 395 feet long, has a 78-foot beam, and will have fully loaded displacement of 21,800 tons. The ship will have a sea speed of 20 knots and a cruising radius in excess of 100,000 miles. With a 124-man crew and additional space for observers and technicians, she will also be able to carry 60 passengers.

The nuclear plant, including the containment vessel, shielding, and propulsion machinery are located amidship (see chart). The propulsion power will be provided by a pressurized water reactor operating at approximately 1,750 pounds per square inch at an average temperature of 508° F. The slightly enriched (4.4 percent) uranium oxide core is in the form of a cylinder 62 inches in diameter and 66 inches high. Reactor control is provided by 21 boron stainless steel control rods inserted in channels between the 32 symmetrically arranged fuel elements. The first core has been designed for a maximum power level of 69 megawatts and is expected to produce approximately 52,200 "megawatt-days." In other words, it will have an operating lifetime of about 3 years' normal operation without refueling.

Safety on Nuclear Merchant Ships

The principal problems in ship design introduced by nuclear propulsion are those related to safety, that is, protection of the environment from radioactive contamination. The safety of the ship, the personnel aboard, and the operating environment had to be and were considered for conditions without precedent.

Containment. One of the basic safety problems of a nuclear reactor is the control of fission products. To provide this control it was decided to install the entire reactor system and its major auxiliary components within a shielded containment vessel capable of confining the mechanical energy released in the event of a severe rupture of the "primary" portions of the



Amidship cross section of NS Savannah showing nuclear plant and shielding.

system. Thus, the containment vessel surrounds all of the primary system, preventing the escape of radioactive material and serving as structural protection for the reactor.

The containment vessel, already installed in the ship, is a welded steel cylinder $2\frac{1}{2}$ inches thick, 50 feet long, and 35 feet in diameter. It will be hermetically sealed at all times during plant operation. Television cameras within the vessel will enable the crew to observe conditions from the externally located control room while the reactor is operating. After shutdown of the plant, the containment vessel may be entered through an airlock for inspection and maintenance. Once operating reliability has been demonstrated on the *Savannah*, an expensive, heavy containment vessel of this type may not be necessary on other nuclear merchant ships.

Shielding. A most important feature of the *Savannah* is the radiation shielding. The main

source of radiation during operation of the ship's power plant is the reactor itself. In addition, minute quantities of impurities and also traces of corrosion products remaining in the demineralized "light" water used as primary coolant will become activated while passing through the reactor. However, a bypass purification system will remove these activated materials automatically by ion-exchange methods.

The following conditions had to be met for areas accessible to passenger and crew:

- In all areas to which passengers have access, the radiation level will be less than that required to produce an integrated total body dosage of 0.5 rem per year. This is a conservative figure since it will be determined at the points of highest radiation, and the computations for the annual dosage will be based on the assumption that a person remained in these areas for an entire year. Allowing for movement aboard ship and taking distance from the reactor

into account, the average exposure received by any passenger remaining aboard for a year would probably be less than 0.2 rem—comparable to levels which would be received on land from background and cosmic radiation. In determining these radiation levels, the average annual reactor power has been computed to be approximately 50 megawatts.

- In all areas where crew members have unlimited access, radiation levels will be less than 5 rem integrated dosage per year. This dose limit is in accordance with the guidelines of the International Commission on Radiation Protection and of the National Committee on Radiation Protection. Since the 5-rem area is relatively small and not in general use and since no crew member will be aboard the ship a full year, it is doubtful whether any crew member will receive an annual integrated dosage of more than 0.5 rem in a year.

- Only officers and crew of the engineering department will be allowed access to the controlled machinery spaces aft of the reactor compartment. Other ship personnel will not be permitted in these spaces except under specific authorization of the captain. The engineering crew will be limited to an integrated dosage well within the guidelines of the NCRP and ICRP and will, of course, be equipped with appropriate personnel dosimeters.

- A health and safety staff will continually analyze the environs of the ship to assess and minimize exposure to radiation and control potential hazards.

- Certain areas in the vicinity of the reactor will be denoted as "limited access areas" and will not normally be entered when the reactor is operating. Those areas located outboard of the reactor compartment include the fan room and lockers for storage. At full reactor power, a radiation level of 1 rem per 168-hour week will be the maximum permissible in these areas. They will remain locked at all times, and the captain's permission will be needed for controlled entry while the reactor is at full power.

- The entire secondary shield, surrounding and encasing the containment vessel will, when completed, weigh more than 1,600 tons. "Ordinary" concrete, in the form of a vertical 4-foot thick "skirt" extending up to the "equator" of the vessel, accounts for 1,600 tons, and the 14-inch layer of lead and polyethylene encasing the upper half of containment accounts for 500 long tons.

Waste management. The basic plan for the collection and handling of radioactive waste aboard the *Savannah* is predicated on complete retention of all solid, liquid, and high-activity gaseous wastes. Remotely handled and stored, these wastes will be held in special tanks for periodic dockside transfer. Ultimate disposal by licensed contractors will be based on procedures used for land-based reactor wastes.

Additional safeguards. The reactor system as well as the ship has been designed to minimize the effects of marine hazards such as storm, grounding, fire, flooding, and sinking. In some respects a nuclear ship may be safer than a "conventional" vessel. For example, the fire hazard in the *Savannah's* engine room is considerably less because of the general reduction in oil piping and hot surfaces and the absence of oil-fired boilers.

With respect to the effects of collision, a recently completed study of marine casualties has shown that on the basis of tonnage and speed not one ship in 95 percent of the world's merchant fleet could penetrate the hull of the *Savannah* to the depth of the laminated steel and redwood collision mats placed on the flanks of the containment vessel (see chart).

The probability of ships in the remaining 5 percent colliding with the *Savannah* and penetrating the containment vessel is currently being evaluated. Large ships generally operate at a reduced speed within and when approaching harbor areas. At these speeds, even the larger ship could not penetrate the containment vessel if it were to strike directly at the reactor compartment. As an illustration, citing the 1956 collision of the *Stockholm* and the *Andrea Doria*, it has been determined that the striking ship would have had to travel 1 to 4 knots faster than her maximum speed to penetrate the *Savannah* even to the collision mat.

If collision leading to eventual sinking should occur, the reactor would be "scrammed," that is, shut down automatically. Cooling of the reactor would be continued by the primary circulation pumps operating on emergency power as long as the ship was afloat. If the vessel were to sink in shallow water, the containment vessel would remain intact, and the exposed surface afforded by the vessel would be sufficient to dissipate residual "decay" heat by natural convection. However, if sinking were to occur in deeper water, where the submergence pressure might cause collapse of the containment vessel, automatic flooding valves would open to admit sea water into the vessel to equalize the internal and external pressure on the vessel. (As soon as the internal pressure was equalized, the check-type valves would automatically close.) The pressure equaliza-

tion, by preventing rupture of the containment vessel, would keep the reactor system intact, thus preventing the escape of radioactive elements. Should an accident by any chance open the reactor core, the consequences would be influenced by the stage of the 3-year fuel cycle.

Potential

The construction of the *Savannah* has posed some new and unique problems. For most of them, satisfactory design and operating solutions have been found; the remainder are under study. Complete containment, retention of wastes, and other safeguards, both nuclear and nautical, have been incorporated to achieve maximum safety. The *Savannah's* experimental years of service may show that less stringent requirements will be necessary in the future.

During the past decade there has been an ever-increasing interest in the application of nuclear power in industry, both to conserve existing fuel resources and to provide an additional energy source. Today other maritime nations are actively conducting programs for

the development of nuclear-powered merchant ships. The potential economic advantages of nuclear power over conventional fuels are great; among these are:

- Elimination of the space and weight requirements for fuel oil, resulting in increased cargo-carrying capacity.
- Longer range, making nuclear ships virtually independent of refueling time losses.
- Operation at speeds higher than those now economically feasible for ships powered by the "fossil fuels."

The *NS Savannah*, however, will not be and is not intended to be economically competitive with conventionally fueled merchantmen. Rather, this "first generation" nuclear-powered merchant vessel will be used to provide a baseline of practical construction and operating experience necessary for application to the design of "second" and "third generation" ships. These, in turn, may attain competitive status within the next decade. Thus, the *NS Savannah* is heralding the transition from fossils to fission, quite as her famous namesake crossed the threshold from sail to steam.

Impairments in the United States, July 1957-June 1958

About 24 million impairments, including chronic or permanent physical defects, existed among the civilian, noninstitutional population of the United States during the year beginning July 1, 1957. This figure, published in a report by the U.S. National Health Survey, Public Health Service, is derived from household interviews with a representative population sample and represents a rate of 141.4 impairments per 1,000 noninstitutionalized persons.

The report, "Impairments, by Type, Sex, and Age, United States, July 1957-June 1958," does not indicate the total number of persons with impairments (since many have more than one impairment) except for conditions such as visual, auditory, or speech defects, mental retardation, cerebral palsy, and absence of extremities.

Rates for specific impairments per 1,000 persons were 5.7 for inability to read ordinary newsprint even with glasses; 12.3 for less severe visual impairments; 0.6 for total deafness; and 33.9 for other hearing defects.

Conditions reported frequently were paralysis and other defects of the limbs, back, and trunk, and impaired speech.

Impairments caused by injury amounted to 33 percent of the total; 41.8 percent for males and 22.2 percent for females. Loss or defects of extremities had the highest proportions due to injuries, and speech defects and blindness, the least. Impairments increased from 52.9 per 1,000 persons at ages under 25 years to 615 at ages 75 and over. (Announcement of publication appears on p. 752.)

A proposed standard method of **Measuring Hospital Capacity**

BY **A. LEMBCKE, M.D., M.P.H., DAVID R. HERMANSEN, M.A.,**
and **ELEANOR POLAND, Ph.D.**

A STANDARD method of determining bed capacity and the adequacy of space in basic departments is necessary in judging the extent to which hospital needs are being met by existing and proposed buildings.

Hospital needs and resources have traditionally been expressed in terms of beds, which by definition include facilities for both adults and children, but not bassinets for the newborn in a nursery, beds in labor rooms and in health centers, and beds used exclusively for emergency purposes. This definition is incomplete, however. Should the count represent the situation on some one day or throughout the year? Should it be the maximum number or the average? These and many related questions have been resolved by the adoption of uniform definitions required for hospital operation and finance, but others have not, especially in the field of hospital survey and planning.

Another consideration is whether the hospital beds that have been enumerated are acceptable in respect to safety and efficiency.

Dr. Lembcke is professor of preventive medicine and public health, School of Medicine and School of Public Health, University of California, Los Angeles. Mr. Hermansen is assistant professor of architecture, University of Kansas. Dr. Poland is project director, Regional Health and Hospital Study, Community Studies, Inc., Kansas City, Mo. This investigation was partially supported by a research grant from the Division of Hospital and Medical Facilities, Bureau of Health Services, Public Health Service.

The most important points to be considered in determining the acceptability of a structure are fire hazards, structural materials, exit facilities, physical condition, location, suitability of design, and adequacy of space in the essential departments.

Generally accepted methods are now available to determine the fire-resistive properties of existing and proposed hospital buildings and structural materials, and the type, number, and location of exit facilities. The physical condition of a hospital is largely a subjective determination, and the same is true of location except where it is regulated by law.

The suitability of design has many subjective elements, such as the location of the various essential departments and the proportion of beds in one-bed, two-bed, and four-bed rooms. It also has a number of objective features, such as whether the building was originally designed as a hospital, the width of doors and corridors, and the minimum and maximum number of beds in a nursing unit. But these are not included in the method we are proposing for use in measuring hospital capacity because the suitability of design as applied to existing structures is more closely related to the concept of "replaceable" bed capacity, than it is to "unsuitable" bed capacity. By "replaceable" bed capacity we mean rooms and departments that are now included in existing bed capacity but that would be differently designed when their physical condition required replacement by new construction. In such authoritative hos-

pital surveying and planning as that under the Federal Hospital Survey and Construction (Hill-Burton) Act, "unsuitable" beds are not counted in determining the needs for new construction.

Importance of Adequate Space

Safety. Since 1942, when 491 persons died in the Coconut Grove fire in Boston, most State and local governments have recognized the necessity of limiting the occupancy of a theater, restaurant, school, or other public place to the number of people who can be allowed in a given space without endangering their lives in case fire or other accidents require that the premises be vacated quickly. Enforcement requires that the maximum number of persons who can occupy such places with safety be determined by reference to standards based on the space available. This principle has not been fully recognized for hospitals, although they present the additional hazards of cross-infections, of mistakes in the distribution of medicines, and other misadventures that may be aggravated by crowding and inadequate space. Cross-infections are typified particularly by the staphylococcal diseases held responsible for many complications and deaths today.

Efficiency. Adequate space for the essential departments of the hospital is as closely related to efficiency in hospitals as it is in the operation of any other institution or service, mercantile or industrial.

Rooms for patients. Modern medical and nursing care call for sufficient space around the bed to permit many procedures to be carried out in the patient's own bed in his own room. Blood transfusion, intravenous administration of fluids and medicines, the use of indwelling catheters and tidal drainage of body fluids and excretions, administration of oxygen, and decompression of the intestine by the Wangenstein apparatus are examples. Even beds must be longer to accommodate the increasing stature of the American people!

Departments. The safety and efficiency of a hospital may be impaired if one or more departments are not in proportion to the others. This occurs most commonly when beds are

added to the nursing department without adding in like proportion to the administration, pathology, radiology, pharmacy, surgery, obstetrics, emergency, dietary, laundry, house-keeping, and mechanical departments or to the facilities for employees and central storage.

Other factors. As noted earlier, space is not the only criterion of suitability, and an area or department must be judged unsuitable if it is unsafe, regardless of the adequacy of its space. However, an area that is suitable in respect to safety factors may be definitively unsuitable if it falls short of meeting minimum space requirements.

General Method

Our method of determining hospital capacity requires that all the rooms or units of space in a hospital be measured, classified as to function, and allocated to the appropriate hospital departments. The areas so determined are then compared with nationally recognized standards of space for such departments. This method presents consistent, objective criteria of the sufficiency or deficiency of each department and of the hospital as a whole. A given hospital may be found deficient in respect to the rooms for patients, the adjunct diagnostic and treatment facilities, and the administrative and service areas, or it may measure up in all respects, or, as is more common, it may meet standards for patients' rooms but not for other departments. The method is sufficiently flexible to accommodate the use of different standards as desired or as they change with advances in medical care.

Definitions of Hospital Bed Capacity

To avoid confusion it is necessary in every instance to distinguish between the three importantly different meanings of hospital bed capacity—bed complement, normal bed capacity, and potential bed capacity.

The terms "normal" and "potential" bed capacity were used by the Commission on Hospital Care in the schedules of information (1) to be gathered in determining hospital capacity, although a discussion of these terms was not included in its published reports (2, 3).

a proposed standard method of

Measuring Hospital Capacity

PAUL A. LEMBCKE, M.D., M.P.H., DAVID R. HERMANSEN, M.A.,
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Another consideration is whether the hospital beds that have been enumerated are acceptable in respect to safety and efficiency.

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The most important points to be considered in determining the acceptability of a structure are fire hazards, structural materials, exit facilities, physical condition, location, suitability of design, and adequacy of space in the essential departments.

Generally accepted methods are now available to determine the fire-resistive properties of existing and proposed hospital buildings and structural materials, and the type, number, and location of exit facilities. The physical condition of a hospital is largely a subjective determination, and the same is true of location except where it is regulated by law.

The suitability of design has many subjective elements, such as the location of the various essential departments and the proportion of beds in one-bed, two-bed, and four-bed rooms. It also has a number of objective features, such as whether the building was originally designed as a hospital, the width of doors and corridors, and the minimum and maximum number of beds in a nursing unit. But these are not included in the method we are proposing for use in measuring hospital capacity because the suitability of design as applied to existing structures is more closely related to the concept of "replaceable" bed capacity, than it is to "unsuitable" bed capacity. By "replaceable" bed capacity we mean rooms and departments that are now included in existing bed capacity but that would be differently designed when their physical condition required replacement by new construction. In such authoritative hos-

units—large hospitals need more toilets or janitor closets, not larger ones. In some functional units, such as waiting rooms, staff conference rooms, and medical records rooms, the space allocation increases in proportion to the number of beds in the hospital, but in others the picture is not as clear. For example, if the director of nursing service in a 50-bed hospital needs an office of 130 square feet, it does not follow that in a 100-bed hospital the same type of office needs to be twice as large, or any larger. In "Elements of the General Hospital" the office in the 50-bed hospital is designed for one person and is furnished with one executive desk, chair, and wastebasket, two straight chairs, one bookshelf, and three filing cabinets. The office in the 100-bed hospital is also for one person and has the same area and same furniture, except that it has only two filing cabinets instead of three (7). Is there then no need to increase the size of areas such as this in proportion to the increase in normal bed capacity?

The answer is that a functional unit such as the office of the director of nursing service need not be enlarged, but the area of the whole administration department of which it is a part does need to be enlarged to accommodate the increased work of directing the nursing service. The more beds in the hospital, the more patients and nurses. The more nurses, the more time records, dossiers and registers, correspondence and conferences, each requiring a little more space. Recognition of this and similar needs is given by suggesting 2,975 square feet for the administration department of the 100-bed hospital in contrast to 1,970 square feet in the 50-bed hospital (5). When the hospital increases to the 100-bed level, the office of the director of nursing service remains constant, but provision is made for the increased records and activities to be accommodated in part in a larger business office with five employees instead of three, in the larger medical records, conference, and waiting rooms, and in two types

Table 1. Area distribution in net square feet per bed for departments of general hospitals

Departments or divisions	15-37 beds	38-74 beds	75-124 beds	125-174 beds	175 beds and over
Administration.....	47.0	39.4	29.8	23.8	23.9
Laboratory.....	6.0	5.6	6.4	6.3	5.6
Morgue.....		5.6	5.0	3.3	2.5
Radiology.....	16.0	11.3	5.6	7.2	6.4
X-ray therapy.....					8.8
Physical therapy.....		10.4	8.2	6.8	6.1
Occupational therapy.....				2.7	2.5
Pharmacy.....	2.0	4.1	4.1	4.0	3.6
Nursing.....	173.6	176.1	180.0	180.0	180.0
Nursery.....	15.2	10.0	8.4	8.0	8.2
Surgical.....	43.0	39.6	31.0	28.1	25.2
Obstetrics.....	29.4	23.5	15.0	12.7	10.6
Emergency.....	12.8	7.4	3.7	3.4	3.9
Dietary.....	44.8	48.0	30.7	25.1	25.2
Central storage.....	25.0	23.5	22.4	22.2	22.0
Employees facilities.....	20.0	15.3	12.2	10.6	9.5
Housekeeping and linen.....	7.4	8.6	5.8	4.2	3.5
Laundry.....	4.6	18.7	12.2	11.3	10.1
Mechanical facilities.....	29.0	20.6	14.8	12.0	9.8
Circulation spaces (corridor, stairways, elevators).....	111.2	160.2	137.1	135.2	134.4
Total.....	587.0	627.9	532.4	507.0	501.6

NOTE: Areas do not include walls and partitions. Bed capacities are based on adult and child beds only. Space for bassinets is included in the nursery, but these bassinets are not counted as beds. The areas do not include outpatient department, quarters for personnel, nursing school or any other teaching areas, fuel storage, garage, or any other area not specified in the department column. For a detailed description of units within the departments by size of hospital, see reference 5.

SOURCE: The five columns correspond with the data summarized in reference 5 for hospitals of 25, 50, 100, 150, and 200 beds, respectively, with the following modifications: (a) a formula room of 255 square feet has been included in the 50-bed hospital dietary facilities as the omission of any formula room in a hospital of this size was apparently an error; (b) small errors in addition or rounding have been corrected.

Bed complement. The term "bed complement" refers to the number of beds set up and ready for use at any given time, regardless of the floor space allotted to the beds or the areas in which they are found. Bed-complement figures are often misleading because they do not indicate the normal safe and efficient working capacity of a hospital. Complement includes beds crowded into rooms intended for fewer patients and beds that have been set up on enclosed porches, in hallways, solariums, treatment rooms, and other areas not originally designed for occupancy by bed patients. Bed-complement figures may be misleading also when, as in resort areas, a portion of the hospital is closed during the off-season.

Normal bed capacity. The evaluation of existing facilities and the design of new areas for patients must be based on the concept of normal bed capacity. The term refers to the number of hospital beds appropriate for the patients' rooms as the result of two factors in design: (a) the provision of a minimum number of square feet per bed and (b) the intention of the designer. The second factor governs in instances where, according to minimum space standards, the area of a room seems sufficient to accommodate a larger number of beds than that for which it was designed.

For example, a hospital room designed for occupancy by only one patient is not to be considered as a two-bed room merely because it has an area as great as the minimum prescribed for a two-bed room. A one-bed room may be relatively large because it was designed as a luxury accommodation, or more frequently the room may be intended for the isolation of a noisy alcoholic or mentally ill patient or one with a communicable disease. In such rooms the location of toilet, lavatory, and storage space and the inclusion of such features as double doors may preclude the accommodation of two beds for average patients without a dangerous or inefficient degree of crowding.

Potential bed capacity. This is a term not frequently encountered. As defined by the Commission on Hospital Care, potential bed capacity designates areas of the hospital currently used for other purposes but intended for the eventual accommodation of patients as the need for hospital beds increases. For example,

student nurses might be housed for a time in a division of the hospital designed for future conversion to a nursing unit for patients.

Standard Space Allocations

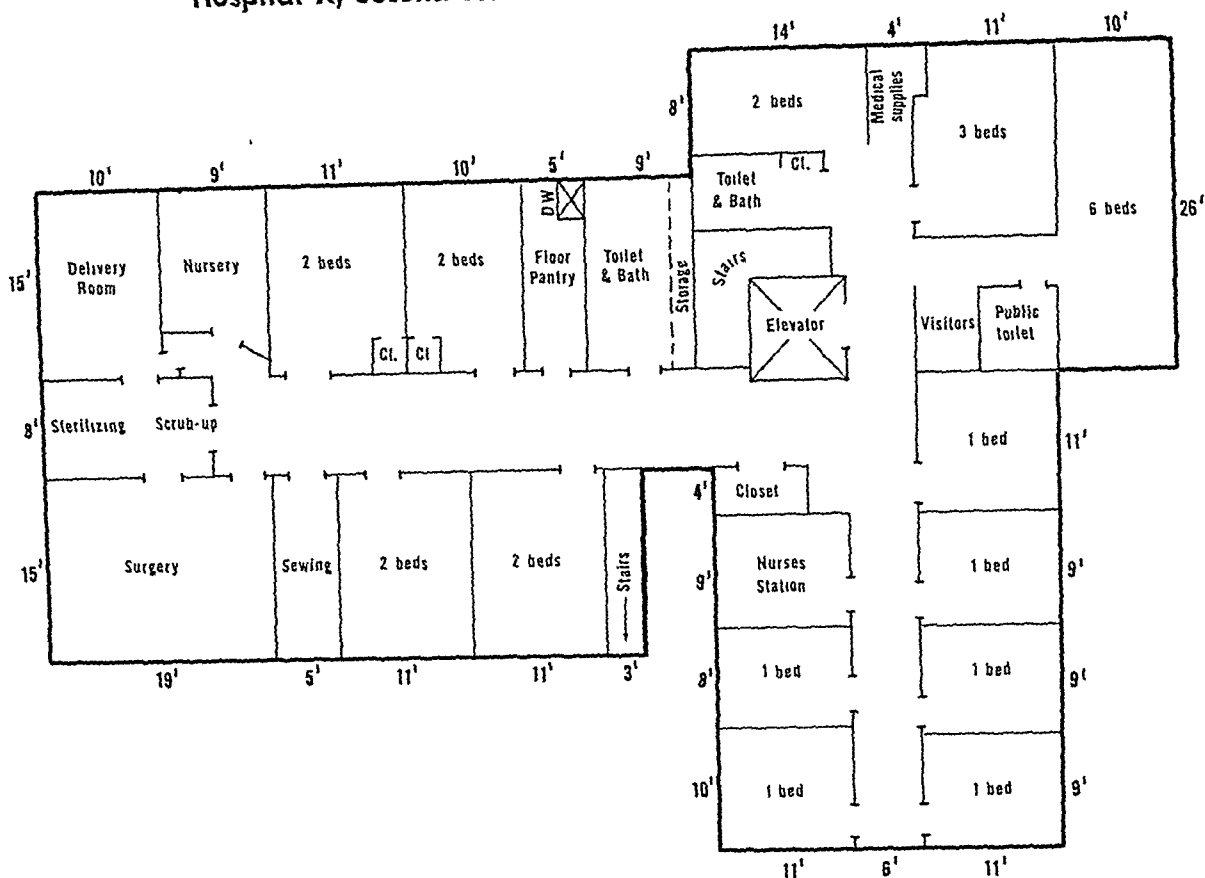
The space allocations used as standards in this study were first published by Shaffer and MacDonald in 1943 (4) for hospitals built in the emergency defense program under the Latham Act. They appeared in *Modern Hospital* in 1947 and 1948 in a series of articles entitled "The Functional Basis of Hospital Planning," prepared by the Hospital Facilities Section of the Public Health Service. The series was reprinted as a 110-page monograph, "Design and Construction of General Hospitals," subtitled "A Definitive Study of the Physical Aspects of the Hospital Plant in Relation to Its Function" (5).

The standards are minimum (6). In fact, a related series of articles published by the Public Health Service in 1946 suggested larger dimensions of various elements of the general hospital for new construction (7), and some of these elements were revised upward in 1952 (8). Many hospitals constructed under the Hill-Burton Hospital Survey and Construction Act exceed the suggested floor areas, for example those described in three articles in the *Journal of the American Institute of Architects* (9). More ample areas were recommended in a 1954 publication from another source (10), and present indications are that future revisions of the standards will call for larger areas. However, the 1947-48 standards seem to be reasonable for judging existing structures.

Standards for Hospitals of Different Sizes

Because "Design and Construction of General Hospitals" gives figures only for hospitals of 25, 50, 100, 150, and 200 beds (5), it was necessary to devise some method of assessing the measured capacity of existing hospitals of intermediate sizes. The problem was complicated by the fact that no one department has a constant number of square feet per bed throughout the range from 25 to 200 beds. In attacking this problem we were well aware that in many instances the space needs of a hospital increase by multiples of functional units rather than by an increase in the size of the individual

Hospital X, Second Floor Plan



partments with minimum standards for hospitals of similar size. The following is a comparison of two actual hospitals.

Hospital X

Hospital X occupies a two-story building, with partial basement, that was designed as a hospital. The exact date of the original building is unknown. One section was remodeled in 1936 and some changes were made in other sections in 1946 and 1951. The general layout of the hospital is indicated by the sketch of the second floor (see chart). Although the structure did not have a fire-resistive rating of 1 hour or more, a sprinkler system complying with State licensing regulations was installed and the building was considered to be suitable.

The 1958 revision of the State Plan for the Construction of Hospital and Medical Facilities listed hospital X as having 40 acceptable beds. An average daily census of 32 was reported for the previous year, which would re-

quire 49 beds for high-level and 55 beds for low-level occupancy, according to the Commission on Hospital Care (2). On the day of our survey, 45 beds were set up. There were 41 patients in the hospital, nurseries excluded.

Normal bed capacity. The area in each room was measured and its maximum capacity was calculated according to our index (p. 678). The figures in table 2 show that although hospital X had a bed complement of 45 on the day of the survey, the normal bed capacity of its rooms for patients totaled only 32. Instead of being set up with 6 one-bed rooms, 13 two-bed rooms, 2 three-bed rooms, 1 six-bed room, and 1 bed in a hall, hospital X should have had no more than 11 one-bed rooms, 9 two-bed rooms, and 1 three-bed room.

Departmental areas. The adequacy of space in other departments essential to the care of inpatients was determined by comparison with the standard space allocations for hospitals of 32 beds. Each functional unit was measured,

of rooms that first appear at the 100-bed level—social service and retiring room (7, 8).

A stepup in this element of a general hospital comes at the 200-bed level, where provision is made for two offices of 215 square feet each, one for the director and one for two assistant directors of nursing service. At this level the increased prestige of the director is acknowledged by giving her a larger office, although not too large for a supervisor of a staff of 80 to 100 nurses and auxiliary workers.

In any event, one can discern the principle that as the volume of hospital service increases a roughly proportional increase in the various departmental areas is required, although the need for more space to perform a specific function may be hidden for a time by the shifting or delegation of various components of the function to other areas.

It was primarily the hidden growth factor explained and illustrated above that influenced us to calculate the space needs of hospitals of other than the sizes in "Design and Construction of General Hospitals" by interpolation and by extrapolation beyond the upper and lower figures. The midpoints between hospitals of given sizes were used to demarcate the size classes of hospitals to which a given number of square feet per bed applied: 15-37, 38-74, 75-124, 125-174, and 175 beds and over, as shown in table 1.

Departmental Areas and Units

The 587 square feet per bed suggested for a 25-bed hospital was assigned to hospitals of the 15-37 bed class, the 627.9 square feet for a 50-bed hospital was assigned to the 38-74 bed class, the 532.4 for a 100-bed hospital to the 75-124 bed class, the 507 for a 150-bed hospital to the 125-174 bed class, and the 501.6 square feet per bed suggested for a 200-bed hospital was assigned to hospitals of 175 beds and over (5). Table 1 presents the standard net square feet per bed for each department according to hospital size. To obtain the standard area for a department in a given hospital, the square feet per bed for the size class in which the hospital falls is multiplied by the normal bed capacity.

A standard square footage per bed for some of the large units within the departments can

be derived in the same manner, but for the reasons given in the subsection, Standards for Hospitals of Different Sizes, it is not often permissible to go below the departmental level in interpolating or extrapolating.

Rooms for Patients

The maximum normal bed capacity of each room for patients is calculated from the following range of square feet per number of beds in a room:

<i>Number of beds</i>	<i>Range in square feet</i>
1-----	95-149
2-----	150-224
3-----	225-299
4-----	300-374
5-----	375-449
6-----	450-524
7-----	525-599
8-----	600-674

This index is based on the minimum of 100 square feet of open space for one-bed and 80 square feet per bed for multiple-bed rooms (private closets, lockers, toilets, and showers excluded) required for hospitals to be constructed under the Hill-Burton Act (11). We believe this choice of standard is justified because our purpose is to analyze and evaluate existing structures rather than to plan new construction.

In applying these standards to patients' rooms, deviations of 5 square feet per bed below the minimum are accepted because measurements made in the field are not highly exact and because of the difficulty of making allowances for columns, radiators, ducts, and similar design features. The majority of measurements, except for small areas such as closets and toilets, were made with a measuring wheel device. Dimensions were recorded at the hospital or rounded in the office to the nearest one-half foot. For example, a dimension measuring between 9 feet 9 inches and 10 feet 2 inches would be recorded as 10 feet, a tolerance of 5 percent. The interval between 11 feet 3 inches and 11 feet 8 inches would be represented by 11 feet 6 inches, and so on.

Application of Method

The method described in this article compares the space for beds and supporting hospital de-

Table 4. Space allocations in surgical and obstetrics departments of hospital X,¹ compared with space suggested for such departments in a 25-bed hospital,² in square feet

Departments or divisions	Actual space in hospital X	Minimum standard for 25-bed hospital
<i>Surgical department</i>		
Major operating rooms-----	285	320
Scrubup facilities-----	30	30
Substerilizing rooms-----	0	50
Central sterilizing and supply-----	55	255
Unsterile supply room-----	0	75
Cleanup room-----	0	90
Janitor's closet-----	0	20
Doctors' locker room-----	0	185
Anesthesia storage-----	0	50
Total-----	370	1, 075
<i>Obstetrics department</i>		
Delivery room-----	150	290
Labor room-----	0	255
Scrubup facilities-----	(³)	30
Substerilizing-----	0	50
Cleanup room-----	0	90
Janitor's closet-----	0	20
Total-----	150	735

¹ 45 beds on survey day.

² Reference 5.

³ The surgical scrubup room is used.

private toilets and very few have closets. There are no subutility rooms, nurses' toilets, or janitors' closets anywhere in the hospital. There is only one nurses' station for two floors and basement. The floor pantries are substandard in size, and the storage areas for linen and other supplies that should be on hand in the nursing unit are not only too small but are all on the second floor, far from the patients' rooms on the first floor and in the basement.

Hospital A

This one-story and basement fire-resistive structure, built in 1956, was designed to accommodate 42 patients in 2 one-bed, 16 two-bed, and 2 four-bed rooms. The one-bed rooms each contained 135 square feet. The multiple-bed rooms each contained 80 or more square feet per bed.

Normal bed capacity. According to our method the normal bed capacity was 40. There

were five beds in one room of 395 square feet, sufficient open space to permit classification as a five-bed room, according to our index, but it was clearly designed for four beds, having no bay for a fifth bed and being identical with another room in which only four beds were set up. As shown in table 5, the space allocated to obstetrics was notably deficient and there was no physical therapy department. The nursing department was deficient in having only two

Table 5. Departmental areas in hospital A compared with minimum standards for a normal capacity of 40 beds, in square feet

Departments or divisions	Standard minimum area for 40 beds		Actual areas in hospital A ¹
	Per bed ²	Per department ³	
Administration-----	39. 4	1, 576	2, 085
Laboratory-----	5. 6	224	265
Radiology-----	11. 3	452	500
Physical therapy-----	10. 4	416	-----
Pharmacy-----	4. 1	164	155
Nursing-----	176. 1	7, 044	5, 745
Nursery-----	10. 0	400	560
Surgical-----	39. 6	1, 584	1, 350
Obstetrics-----	23. 5	940	585
Emergency-----	7. 4	296	500
Dietary-----	48. 0	1, 920	1, 785
Central storage-----	23. 5	940	1, 945
Employees facilities-----	15. 3	612	695
Housekeeping and linen-----	8. 6	344	310
Mechanical facilities-----	20. 6	824	1, 835
Circulation spaces (corridors, stairways, elevators)-----	160. 2	6, 408	5, 140
Total departmental area ⁴ -----	603. 6	24, 144	23, 455
Potential capacity			
Nursing department storage ⁵ -----	-----	-----	190
Other ⁶ -----	-----	-----	11, 620
Total potential area-----	-----	-----	11, 810
Grand total-----	603. 6	24, 144	35, 265

¹ 42 beds on survey day.

² Standard for hospitals of 38-74 normal bed capacity.

³ Product of standard space allocation per bed and normal bed capacity.

⁴ Excluding space for laundry since laundry is not done in institution.

⁵ Furniture storage, suitable for future addition to nursing department area.

⁶ Unoccupied space in basement suitable for future additions to adjunct diagnostic and treatment facilities or service departments.

Table 2. Normal bed capacity of hospital X compared with bed complement at time of survey

Area of rooms (square feet)	Bed comple- ment	Normal bed capacity
<i>One-bed rooms</i>		
88.....	1	0
99.....	1	1
99.....	1	1
99.....	1	1
110.....	1	1
121.....	1	1
<i>Two-bed rooms</i>		
112.....	2	1
140.....	2	1
140.....	2	1
140.....	2	1
140.....	2	1
140.....	2	1
150.....	2	2
150.....	2	2
150.....	2	2
155.....	2	2
165.....	2	2
165.....	2	2
165.....	2	2
<i>Three-or-more-bed rooms</i>		
165.....	3	2
195.....	3	2
260.....	6	3
Hall-bed.....	1	0
Total.....	45	32

and the dimensions and the use being made of each room at the time of the survey were recorded on floor plans of the hospital (see chart). The data were processed in our office by assigning each room to the appropriate department and entering the dimensions and square feet on forms that grouped the rooms by departments and indicated whether the function was required for a hospital of this size.

The comparison of the areas in each department of hospital X with the corresponding standards for a 32-bed hospital shows a measured deficit of 9,018 square feet. The departments that were most deficient were surgery, with about one-fourth of the space it should have in a 32-bed hospital, obstetrics with 150 instead of 941 square feet, and dietary with 445 instead of 1,434 square feet. Administration had only 575 instead of 1,504 square feet (table 3).

The departmental deficiencies can be seen more clearly if considered in the detail suggested by table 4. The surgical department has insufficient space for central sterilizing and supply, and no space at all for substerilizing room, unsterile supplies, cleanup room, doctors' locker room, janitor's closet, and anesthesia storage. The obstetrics department has inadequate space in the delivery room and none for labor room, substerilizing, cleanup or utility room, and janitor's closet. There is no scrubup room for the obstetrics department alone. The surgical scrubup room serves both departments.

Although departmental deficiencies appear most clearly in administration, surgery, obstetrics, and the service departments, it is important to note that the nursing department lacks 1,560 square feet of the space needed to support the normal capacity of 32 beds. From the floor plan it can be seen that most of the rooms for patients have no private or semi-

Table 3. Departmental areas in hospital X compared with minimum standards for a normal capacity of 32 beds, in square feet

Departments or divisions	Standard area for 32 beds		Actual areas in hos- pital X ¹
	Per bed ²	Per depart- ment ³	
Administration.....	47.0	1,504	575
Laboratory.....	6.0	192	180
Radiology.....	16.0	512	435
Pharmacy.....	2.0	64	100
Nursing.....	173.6	5,555	3,995
Nursery.....	15.2	486	100
Surgical.....	43.0	1,376	370
Obstetrics.....	29.4	941	150
Emergency.....	12.8	410	0
Dietary.....	44.8	1,434	445
Central storage.....	25.0	800	405
Employees facilities.....	20.0	640	45
Housekeeping and linen ⁴	7.4	237	75
Mechanical facilities.....	29.0	928	185
Circulation spaces (corri- dors, stairways, eleva- tors).....	111.2	3,558	2,595
Total ⁴	582.4	18,637	9,655

¹ 45 beds on survey day.

² Standard for hospitals of 15-37 normal bed capacity.

³ Product of standard space allocations per bed and normal bed capacity.

⁴ Excludes standard space for laundry because there is no laundry in this hospital.

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Methylchloride Intoxication

One death and two serious illnesses occurred recently in a small Kentucky plant fabricating Styrofoam parts, used primarily for insulation of refrigerators. The Occupational Health Branch, Public Health Service, the Kentucky State Department of Health, and the company which produces the Styrofoam cooperated in an investigation.

Symptoms were those of central nervous system damage. The man who died had worked on various machines fabricating Styrofoam parts for more than 2 years. A few weeks prior to his death, he developed what appeared to be a slight cold, followed a few days later by dizziness. The two other employees who became ill also showed signs of dizziness, accompanied by a staggering gait.

Methylchloride is used as a foaming agent in the production of Styrofoam. The material contains many tiny unconnected cells filled with the gas which is released when the Styrofoam is cut or sawed. In the Kentucky incident, poor ventilation during prolonged cold spells led to the accumulation of dangerous amounts of methylchloride in the work environment. The plant agreed to remain closed until adequate ventilation equipment could be installed.

one-bed rooms. The other deficiencies, in pharmacy, surgery, dietary, and housekeeping were minor.

Potential bed capacity. As shown in table 5, a room of 190 square feet used to store furniture had been designed for patients and provided a potential capacity of two beds. Also, 11,810 square feet of undeveloped space in the basement was adequate to make up the total deficiency of 2,473 square feet in physical therapy, nursing, surgery, obstetrics, dietary, and housekeeping, if and when necessary, and in addition it provided a potential capacity of 7,879 square feet, enough to provide supporting departments for an 18-bed addition to the nursing department.

Findings for Two Hospitals

One of the two actual hospitals used to illustrate the method had 45 beds set up on the survey day, but was found to have a normal capacity of only 32 beds and a measured deficit of 9,018 square feet in the departments essential for a 32-bed hospital.

A more modern hospital with 42 beds set up on the survey day was found to have a normal capacity of 40 beds and a potential capacity of 2 additional beds. It had sufficient unassigned space to compensate for existing deficiencies in the departments, and undeveloped space sufficient to support an 18-bed addition to the nursing department if and when it should become necessary.

Surplus Space

Surplus space in a department or a hospital is not necessarily an extravagance. For small hospitals especially it has been recommended that new hospital construction provide basic facilities for future expansion of 50 percent or more. "... growth is to be expected and it should be planned for. It is good policy to install in a 50-bed hospital, for instance, service facilities large enough to care for 100 patients and to draw plans paving the way specifically for expansion to that capacity. Then when demand has reached the point where expansion is justified, patients' rooms can be added at minimum expense and with minimum dislocation of existing services" (12).

Conclusions

As a result of our studies, we strongly recommend that existing hospital facilities be re-surveyed on the basis of the criteria outlined below, to determine whether they have sufficient space, properly distributed, to meet the functional demands of modern hospital care and to guarantee a reasonable measure of safety for the patient.

1. Each division, wing, or building that is unsafe or unsuitable for its purpose because of fire hazards, physical deterioration, and dangerous structural features or materials should be classified as "unsuitable." Thenceforth, only areas that are suitable should figure in the calculation of normal bed capacity and space utilization in the basic departments.

2. The rooms for patients in the nursing department should be measured and classified as described in this article to determine the "normal bed capacity." This figure should supplant the current usage of "bed capacity" that is usually based rather loosely on sources no more objective or authoritative than an unsupported statement from the hospital, or inspection without measurement.

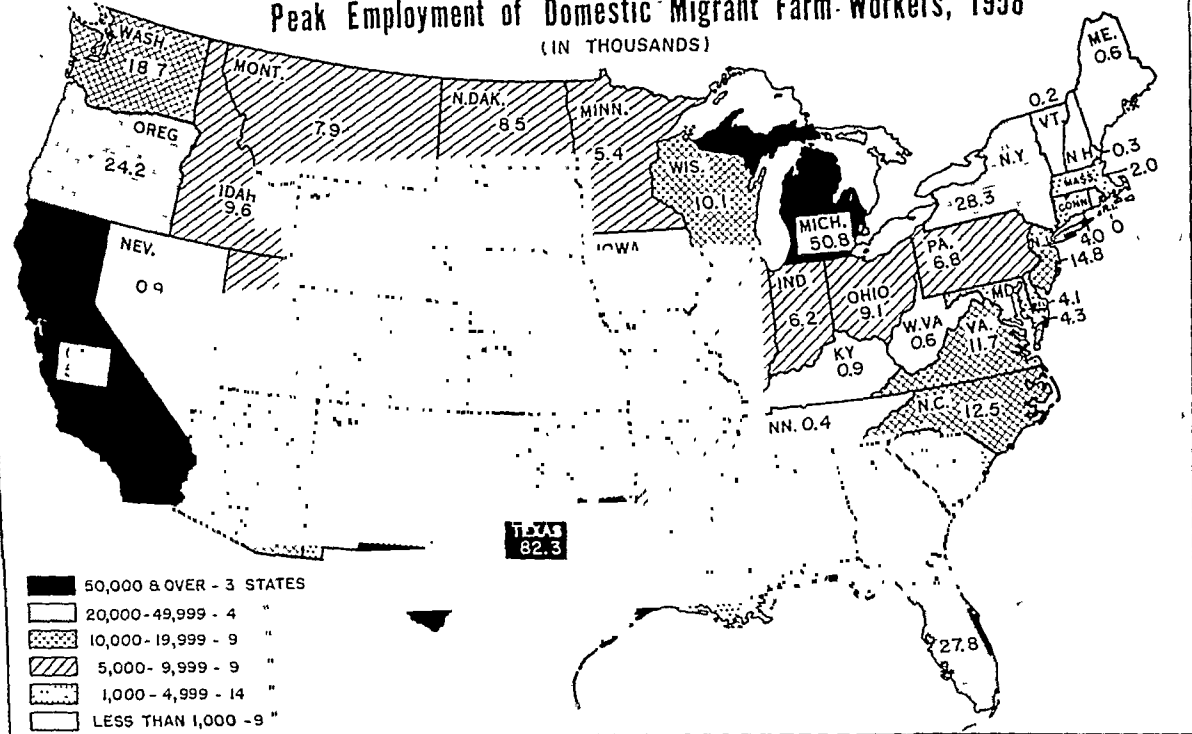
3. The other rooms in the nursing department and the areas of all other basic hospital departments should be measured, and the standard areas required by the normal bed capacity should be calculated as described in this article.

4. The deficiency in each department should be calculated by subtracting the actual from the minimum standard area. Because this method deals with minimum figures, only deficits are counted. Surpluses should not be counted, with the single exception of potential bed capacity as defined early in this article.

This index of normal bed capacity and departmental space needs provides a quantitative measure of the adequacy of the individual hospital. It also constitutes an important step toward a complete and objective definition of hospital obsolescence, which is essential to determining the extent to which the hospital needs of a region (or a State or a nation) are met by existing and proposed hospital buildings. The hospital with deficits in essential departments can be regarded as obsolescent in that it cannot meet functional demands for modern hospital care.

Peak Employment of Domestic Migrant Farm Workers, 1958

(IN THOUSANDS)



Federal act. States are encouraged to be liberal by the Federal agencies involved.

Certain types of illnesses which are of public concern, for example, tuberculosis and venereal diseases, are also treated with greater liberality by some States, regardless of the residence of the patient. Migrant labor is considered a high-risk group with respect to incidence of communicable disease. Maternity, chronic diseases in young children, and accidents also bring some relaxing in State residence requirements.

Local communities in some areas have attempted to meet immediate problems of health services for migrants by setting up clinics, as in Fresno, Calif. Church groups have sometimes identified health needs in migrant camps and acted as referral agencies. Junior leagues have set up sick baby clinics and provided free medical and nursing aid. Local public health departments have added extra nurses to their staff during the peak of the crop season. They have set and maintained levels of sanitation and environmental health in migrant labor camps.

The major part of funds to finance health services for migrant agricultural workers has come from private sources, and much has come involuntarily. Hospital and medical bills are simply left unpaid at the end of the crop season. These are eventually charged to charity care, unless the "home" county or the individual growers or the growers' associations or processing companies can be persuaded to meet part or all of the bill.

With few exceptions, there is little evidence that efforts to provide migrants with health services even temporarily consider at the same time possible ways to reduce needs, and thereby costs, through improvement of housing and sanitation, accident prevention, and other measures. Although many adaptations have been made to try to fit programs to migrants, at the present time none that the committee identified provides for more than the temporary period of a migrant's residence and employment in a single location except programs for offshore and foreign workers and isolated programs for domestic workers under somewhat similar working conditions. Moreover, the extent and kind of services afforded mi-

Financing Health Services For Migrant Farmworkers And Their Families

THE PRESIDENT'S Committee on Migratory Labor, composed of the heads of five member agencies—the Departments of Agriculture, Health, Education, and Welfare, Interior, Labor, and the Housing and Home Finance Agency—has prepared a working paper on Financing Migrant Health Services.

The paper is basically a resource document and covers various methods currently in use or proposed to finance health services for foreign and offshore workers, and for domestic farmworkers in the continental United States. Health services as defined by the committee range from preventive services (including sanitation) through short-term and long-term medical care.

The committee found that the current programs and proposals for financing migrant health services run the gamut of those found in existence for the general population. Responsibility for planning, providing, and financing these services has been taken in the community by various groups such as individual employers and employer associations, private medical personnel and medical organizations, public health agencies, civic and church groups, private and public welfare agencies, private insurance carriers, and migrant labor crewleaders and the migrants themselves.

The committee considered existing voluntary health insurance programs, provision for medical care and indemnity under workmen's compensation laws, medical and related care under public programs such as general assistance (with special consideration to residence requirements), and a variety of grower- and community-sponsored programs and proposals.

The committee also compiled a number of recommendations made by recent conferences on agricultural migrants and by national voluntary organizations as a guide to interested private and governmental agencies in their consideration of methods of financing the health care of agricultural migrants. The inclusion

of specific programs or proposals does not imply endorsement, nor the omission of others unacceptability.

Of particular interest is the summary of health insurance coverage in existence for Mexican nationals, British West Indians, and Puerto Rican contract workers, by type of carrier, coverage, premiums, and benefits. The health insurance arrangements are made under the auspices of governmental agencies, but are provided by private insurance companies. They cover the foreign and offshore worker from the time he enters the United States to work (and in some instances even before arrival) to the time he leaves. Domestic migrant agricultural workers as a labor force group are not so covered, except in scattered and minor instances.

The digest of farmworker coverage under workmen's compensation laws, by States, is also an important and useful source table. There are no States in which the law—compulsory or elective—applies to migrant farm labor as such. If migratory farmworkers are covered, it is by virtue of the fact that agricultural workers per se are covered. Under some State laws, even if workers are covered as a class, they may not be covered as individuals because of numerical exemptions per employer.

An analysis of medical and related care under public programs highlighted the residence requirement for eligibility under most State and local general assistance laws and regulations. Residence requirements varied from 6 months to 5 years out of the last 9 years, with 1 year the average. Since so many migrant workers are "stateless," and hence ineligible for voting and other rights and responsibilities of citizenship, they are not the beneficiaries of reciprocal arrangements among States whereby residents of one State may be cared for while temporarily residing in another.

Some States which are hosts to a large number of migratory farmworkers have made efforts to provide some modicum of medical and hospital care, for example, New York, Florida, Pennsylvania, and Maryland.

Under the State programs, conducted with Federal aid, involving crippled children and vocational rehabilitation for adults, there is no reference to requirement for residence in the

Insured Psychiatric Care

EDITH S. ALT

PROVISION of psychiatric care, particularly for ambulatory persons in the low-income and middle-income groups, is high on the list of unsolved health service needs facing this Nation. Courageous experiments with insurance for mental illness, however, have suggested that it may be possible to widen distribution of psychiatric services. Notably, the Central Institute of Psychogenic Illness of the Health Insurance Fund of West Berlin offers valuable experience in this unfamiliar field.

In a national atmosphere where the potentialities of science are dramatized by radio, television, movies, and newspapers, a popular demand for efficacious psychiatric care is urgent. But there are a myraid of problems that need to be resolved before this demand can be satisfied.

The consumer, for example, often finds it difficult to determine for himself or his family what constitutes an appropriate psychiatric referral. And the consumer is not alone in this dilemma. The psychiatrist's colleagues in other specialties of medicine, social work, law, education, housing, and industry often refer to him the recalcitrant, uncooperative person whom all have given up as too difficult to deal with in the normal course of events.

In other words, the range of problems considered appropriate for psychiatric referral can be as broad as life itself (1). Moreover, the pressures generated by individuals who feel the need of care, by professional colleagues, or by community services acting on their own behalf

are such that an extraordinary amount of psychiatric time is diverted and not necessarily well used.

The first step then is to define what is meant by psychiatric need. Within the context of these remarks, I shall limit the use of the phrase "psychiatric need" to designate psychiatric illness. This confines the definition to those manifestations of illness that seriously interfere with normal and usual functioning of adults and children in the activities of daily living. It excludes many kinds of expressions of deviant behavior as well as the wide variety of measures designed to make people happier.

If we accept these limitations, the next step is to relate the nature of the psychiatric problem to the kind of treatment needed. The present failure to clarify this relationship has resulted in an enormous waste of psychiatric time, and has added to the frustration and confusion of the consumer who does not know where to turn or what kind of psychiatric service he should seek. The waste is also a consequence of our present lack of organized psychiatric services on a community basis. A more clearly designed community plan will have to be fashioned to conserve resources of treatment as well as to expedite referrals. Insurance protection will not miraculously wipe out this grave problem. But any systematic screening method that will help consumers clarify and assess their need, and bring them more directly toward the kind of psychiatric treatment required, is bound to have a profound effect upon the practice of psychiatry and contribute to its productive use.

New York's Plan

In this connection, it seems pertinent to refer to experience in the Health Insurance Plan of Greater New York. Since its establishment 12

Mrs. Alt is the director of the division of community resources for the Health Insurance Plan of Greater New York. This paper, in somewhat different form, was originally presented at the conference of the American Psychiatric Association in Chicago, May 14, 1957.

grants, and the circumstances under which they are offered and financed, differ widely from one locality to another. A typical domestic farm migrant is unlikely to find the same conditions prevailing in any two places where he lives and works during the year, especially if his work itinerary covers two or more States.

Migrants share with other low-income farm people problems in financing health care through insurance or other means; they share with most other farmworkers lack of workmen's compensation coverage; and they share with other mobile groups problems of obtaining care in areas where residence restrictions are

applied as a condition for eligibility. Proposals directed toward these broader groups hold promise for the migrant population.

Among the continuing needs in order to facilitate the provision and financing of health services to domestic migrants are (a) the stabilization of their employment situation; (b) the incorporation to the fullest extent possible in the domestic worker program of the standards now found in the foreign and offshore program; (c) the availability of some common denominator of health service and educational and informational effort from one community to another.

A Charge on Our National Conscience

It is intolerable and indecent for a society to produce by overworking and underpaying human beings. Even if the product may cost more, we, in this country, usually accept the difference in cost because it is the man that counts—not the thing.

It is my conviction that the migrant farmworker will never take his place as a fully useful citizen, and never be able to successfully resist exploitation, until, first, Federal legislation guarantees him a decent minimum wage upon which he can build a decent and independent life; second, unless he has fairly continuous employment; third, until he receives the equal protection of all Federal and State laws, such as enforced housing codes, enforced safety codes, accessible health services, and protection of his person in the form of compensation for injury and unemployment.

Progress in the health of migrants depends upon the removal or adaptation of residence requirements in the States.

The Federal Government can act in certain directions—research and inform—but it cannot teach or develop and enforce housing codes or State highway safety codes or care for the medical needs of all our citizens. The States must do that, and the communities within the States . . . only they can take the big step, removing the residence requirements that keep the school doors locked against migrant children.

The migrant and his family are lonely wanderers on the face of our land. They are living testimonials to the neglect that is possible in a wealthy and aggressive economy that prides itself on the protection of the individual. They have no lobby—no power at the polls. Their lot often seems hopeless. But if we really want to help, we can—continuously, undramatically in action, not mere words. We must, for the migrant is a charge upon the conscience of us all.—HONORABLE JAMES P. MITCHELL, *Secretary of Labor*. (Excerpts from statement at hearings of the National Advisory Committee on Farm Labor, February 5–6, 1959.)

needs, setting psychiatric treatment apart as not an essential ingredient of medical care. From a practical point of view, lack of such service cannot help but increase the irritation and frustration of physicians treating subscribers who are not getting the psychiatric care they need. As in private practice, these patients often become high utilizers of medical services.

Broad Financial Aspects

We should now look at the broader population to get a fuller understanding of the financial aspects of the problem. Let us consider the fact that 1 family out of 6 in the Nation has an income of \$7,000 (2). If we are considering those who can really afford to buy psychiatric care on a private basis, we should have to restrict the population to those having a family income of \$10,000 per year. This represents 1 family in 14.

The inability of most of the population to pay for psychiatric care on a private basis becomes even clearer when we study the net income and cost figures. The crucial fact is that only 10 percent of the population at the present time is in a financial position to buy private psychiatric care. In other words, some 90 percent of the population must either look to philanthropic or governmental sources for treatment or delay treatment, go without treatment, or build up excessive debts.

A report prepared by the Community Council of Greater New York (3) analyzes the amount of money available, beyond basic living costs for employed persons and heads of families, to purchase psychiatric care. This study reveals that a family of four with an annual income between \$7,000 and \$8,000 and living modestly in a metropolitan community would have only \$7 or \$8 a week for psychiatric treatment fees over a period of 50 weeks during the year. A family of four with an income of \$10,000 might conceivably have not much more than \$20 a week for psychiatric fees.

We can assume that the inability of many medical care programs to include psychiatric service is due to the high cost of this service and its scarcity. However, with the trend in this field moving from hospital care to community care, we see a change having important

bearing on our discussion. With the consumer's increased knowledge about psychotherapy, optimistic reports of shorter treatment periods, and more emphasis on early casefinding in hospitals, group practice, and health centers, we can expect that more people with psychiatric illness will come for treatment and at an earlier time in the illness. This is particularly true for the insured consumer. A nationwide family survey, conducted by the Health Information Foundation, revealed that insured families, regardless of income, are more likely to use services available to them than uninsured families in the same groups (4).

There seems to be little doubt that the demand by consumers for psychiatric care is rolling up around us. We see, for example, an increasing number of organizations sponsored by citizens springing up in all parts of the country, and each is trying to find solutions to various aspects of this problem.

The complexities involved in providing the consumer with protection through insurance are apparent, especially since we believe the standards for this care should be similar to the standards for other medical care. In other words, a psychiatric program should remove the economic deterrent to those seeking help. It should provide treatment adequate in amount, kind, and quality as early in the onset of the illness as possible. Appropriate participation by the related professions of psychology, social work, and therapeutic education should be an integral part of the plan. Its design needs to take into account the fears, anxieties, and resistance of patients who are seeking, accepting, and utilizing this kind of care.

West Berlin's Plan

The Health Insurance Fund of West Berlin, with its Central Institute for Psychogenic Illness, has been able to meet a wide variety of psychiatric needs, including psychotherapy. From first-hand information gained during a visit to Germany in the summer of 1956 and from the 1953 and 1954 annual reports of the program, I can give the following description.

One of the reports states that the basic premise underlying the program is that a great deal of illness "is not primarily organic but is emotional or mental in nature. The Health Insur-

years ago, the plan has worked with a wide range of psychiatric and emotional disorders requiring treatment, and has had to struggle to match needs with scarce treatment services available at fees possible for most subscribers.

The Health Insurance Plan provides psychiatric consultative and diagnostic services. It is a prepayment insurance organization, community sponsored, with medical care provided by 32 separate medical groups. Each medical group has at least one psychiatrist. Referral to community resources may be had through social services within the plan.

Psychiatric consultation is available on referral by the family physician or by other specialists so that the patient can receive consultation without delay. This means that the subscriber has the benefit, without financial barrier, of early detection and diagnosis of a psychiatric condition. An added advantage is that the physicians in the medical groups have known their patients over a period of years and, therefore, often have pertinent information on their general health and family situations.

These are distinct gains. But since the plan does not, as yet, include psychiatric treatment as a benefit, HIP is chronically pressed to find psychiatric treatment services for those diagnosed as needing such care.

It is my impression that the experiences of HIP in seeking psychiatric care for subscribers confirms the general community experience. The HIP population includes a representative cross section of a metropolitan community: school teachers, policemen, sanitation workers, governmental employees of all levels, writers, clerks, movie projectionists, machinists, and business executives among others. On an income basis, we find that approximately 90 percent of the subscribers report their earnings as less than \$5,000 annually if single, and \$7,500 annually if heads of families. This leaves 10 percent reporting their earnings as beyond these rates.

Recognizing that the bulk of the HIP population falls into the low- and middle-income groups (actually not too different from our national distribution), it follows that the psychiatric fees they can afford to pay are limited, unless they go into debt or change their living pattern. Some of these consumers may

have the double handicap of limited funds and a discouraging diagnosis.

In many communities it is clear that among the adults and children most urgently needing care today are the extremely ill who are not yet in State hospitals or are not eligible. These are the individuals for whom ambulatory or day care is most difficult to obtain. Many clinics, agencies, and private psychiatrists find them difficult to manage and too unrewarding to be accepted for treatment.

Besides patients with extreme or chronic mental illness there are others for whom care is particularly difficult to obtain: individuals who require immediate treatment in order to meet crises; those who with intensive treatment could avoid hospitalization; and those whose conditions can be diagnosed adequately only through a comprehensive study employing interdisciplinary collaboration.

There are others whose psychiatric needs are interwoven with serious medical difficulties. Within this category are those with amputations, allergies, ulcers, and heart conditions who need integrated treatment. Among these, and others, we find persons whose ability to function in work, education, and family life is so seriously impaired that they require psychiatric treatment to attain a self-maintaining level of living.

Disadvantages in not providing psychiatric treatment as part of a comprehensive medical care plan are recognized by most organizations providing such care. In HIP, the psychiatrists themselves have urged that as soon as it is feasible psychiatric treatment should become a part of the plan.

In addition to the clinical need to provide treatment service, especially for those needing short-term ambulatory care, there are additional values from a mental health point of view that deserve mention.

Excluding psychiatric treatment from any plan may well reinforce in a patient the feeling of being a special problem, of being different, or of having a stigma. At the same time, it is not unlikely that physicians in other specialties would be affected in their attitudes toward psychiatric treatment. Exclusion strengthens any sense of difference the physician might harbor between psychiatric need and other medical

It is difficult to compare costs for the United States and Germany for the psychotherapeutic services, since the compensation of physicians differs considerably between the two countries. At their own rate of payment, it costs the institute an average of DM 750 per patient served per year. At the present rate of exchange, this would be about \$178.50.

The full-time physicians receive monthly salaries ranging from DM 700 for the young psychiatrists to DM 1,400 (before 20 percent taxes). The payment is DM 5.00 per hour for medical therapists and DM 4.00 per hour for nonmedical therapists. Each psychiatrist sees about 7 patients twice a week and participates in screening about 16 or 17 applicants a week.

The provision of psychotherapy, though it had been included in the health insurance program for 10 years, was still a controversial issue. However, four other cities in Germany also give psychotherapy services to subscribers of their insurance plans: Munich (paid by social insurance and the university), Göttingen, Heidelberg, and Hamburg.

It is the belief of those at the institute that a great deal of knowledge has been accumulated with regard to the appropriate integration of psychotherapy within the framework of medical care. As a result, they look forward to replacing full analysis for the treatment of neurosis with psychotherapy, in certain circumstances.

For those interested in further substantiation of the results of the psychotherapy program, the Central Institute for Psychogenic Illness has published studies assessing their achievements.

Conclusion

It is my belief that the consumer's demand for psychiatric treatment will continue to increase. The problem of mental illness, now that it is in the open and acknowledged, goes to the heart of our social health. Those working in the field can, hopefully, influence the forms the solutions will take.

We cannot underestimate the complexities and difficulties that must be faced in order to achieve sound planning. At the same time, I should urge that an understanding of these problems be shared with consumers so that their efforts can supplement those of all professional and planning groups striving to meet these needs.

Summary

The experience of the Health Insurance Plan of Greater New York, which provides psychiatric consultation but not treatment, offers abundant evidence of the need for more readily available and financially feasible psychiatric services for low- and middle-income groups. From the fact that only 10 percent of the people in the United States can afford private psychiatric care, it is clear that the lower income groups face a serious problem in obtaining psychiatric help, particularly psychotherapy of long duration.

An existing insurance plan, the West Berlin Health Insurance Fund, with its Central Institute for Psychogenic Illness, has been able to provide its members full study, psychiatric treatment, and psychotherapy. Each member accepted for treatment (more than one-third of the applicants) receives 150 to 200 treatment hours over a period of 1 to 1½ years.

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ance Administration therefore organized the Institute for Psychogenic Illness . . . so that insured persons could receive psychotherapeutic treatment."

The health insurance program, which covers some 750,000 people, operates through a series of polyclinics, or health centers, located in various districts of the city. Psychiatrists in these polyclinics may themselves treat patients with psychiatric problems, using any of several psychiatric methods, including shock therapy or sleep therapy. For psychotherapy, however, they refer patients to the Central Institute for Psychogenic Illness.

The psychotherapeutic services are given only to ambulatory patients who are able to remain in the community. In addition to patients referred by the polyclinics, the institute cooperates with mental hospitals in the region by accepting for followup some patients after they are discharged.

The Health Insurance Fund provides for 150 to 200 treatment-hours for each patient, but the institute tries to get results in 100 hours. Both individual and group therapy are provided. Patients receiving individual treatment are seen 2 or 3 times a week over a period of a year or a year and a half.

Patients referred to the institute are given at reception a preliminary examination lasting 1 to 2 hours. Later they receive a complete physical examination including extensive neurological examination. About 2 weeks after that, the patient returns for the institute's decision as to whether he is accepted. Two psychiatrists and an internist review the findings, decide whether the patient is treatable, and outline the general plan for treatment if the patient is accepted. A diagnosis is established.

The institute sees from 120 to 150 new adult patients and from 50 to 60 new children a month. Of these, according to the institute's criteria, one-third are not treatable, one-third have a good prognosis, and the final one-third are in a borderline category. Those considered unsuitable for treatment are referred back to the polyclinic or to some other service for supportive psychiatric or social care. The one-third with a good prognosis are generally accepted, and the one-third that are considered borderline are studied more carefully to deter-

mine whether or not they can be helped. The institute staff apparently tries to accept the borderline group if there is any possibility of response to treatment.

The waiting period between acceptance and beginning of treatment is usually about 3 months.

The comprehensive character of its diagnostic and screening service seems an important factor in the successful operation of the program. Many believe the institute's ability to maintain stable and effective service lies in the team studies that precede the decisions for accepting a patient. Another significant factor in the institute's program is the seeming effectiveness of its time-limited psychotherapy.

In general, the institute accepts most neuroses, especially compulsive, obsessive, and agoraphobic. They do not accept schizophrenic patients.

Reports on psychotherapy are submitted to the director of the institute after the first 50 hours of treatment and when treatment is completed. If a patient has not improved sufficiently at the end of 150 hours of psychotherapy to discontinue treatment, the psychotherapist must justify an extension.

There are no psychologists with the clinic, and no psychological testing is done. Part-time group psychologists work in group therapy. There are no social workers at the institute, but the staff may call on social work service from outside agencies.

Persons treated by the institute through 1953 numbered 5,114. Investigation of 1,389 dismissed cases showed the following results: cured, 538 (39 percent); improved, 401 (28 percent); unchanged, 275 (20 percent); results not yet determined, 175 (13 percent).

In order to determine to what extent a permanent result had been achieved, special studies were made of 300 former patients whose treatment had been terminated successfully 3 or at least 2 years previously. Of these, 83.7 percent had retained the benefit of their treatment; 13.6 percent had relapsed, and the status of 2.7 percent could not be evaluated. These results were confirmed by neurologists and internists of the Central Association of Specialists, which is not connected with the Institute for Psychogenic Illness.

The inventions of clever men threaten the survival of the species. As a defense against the hazards of modern technology, health agencies have developed specific programs to control hazards in the industrial environment.

Is Man Becoming Obsolete?

DAVID E. PRICE, M.D.

IN A RECENT television program, James Thurber, in his casual way, noted that we are now living on the brink of "was." This rather neatly sums up the growing public concern that, even if we escape destruction by war, something else, probably subtle, insidious, and gradual, may eventually cause us to become a "has been" species.

The rationale for such a view is not entirely unreasonable. The technological world man has created bombards us with countless products which combine within our bodies as well as in our environment to cause reactions that we as yet know almost nothing about.

Radiation is now perhaps the major current cause of concern. How much radiation will the infants of 1959 absorb in the course of their lives from food, water, air, medical and dental treatments, and occupational exposures? What effect will it have upon them and their descendants? At this stage, we just do not know, and unfortunately the mass investment in worry is probably greater than the investment in efforts to find out.

But radiation is only one aspect of man's changing environment. With the growth of chemical industry, organic materials of un-

known toxicity are being introduced at an ever-accelerating pace. As Dr. William Shepard has observed: "Chemists can produce and put into use a dozen new products while we painstakingly lay out a 3-year research project to test the toxic qualities of one." If we live in the city, we wonder whether fumes from industry, some of them odorless and invisible, are poisoning our air. If we live in the country, we worry about the effects of the herbicides and pesticides which are applied to the land and then leach into the streams.

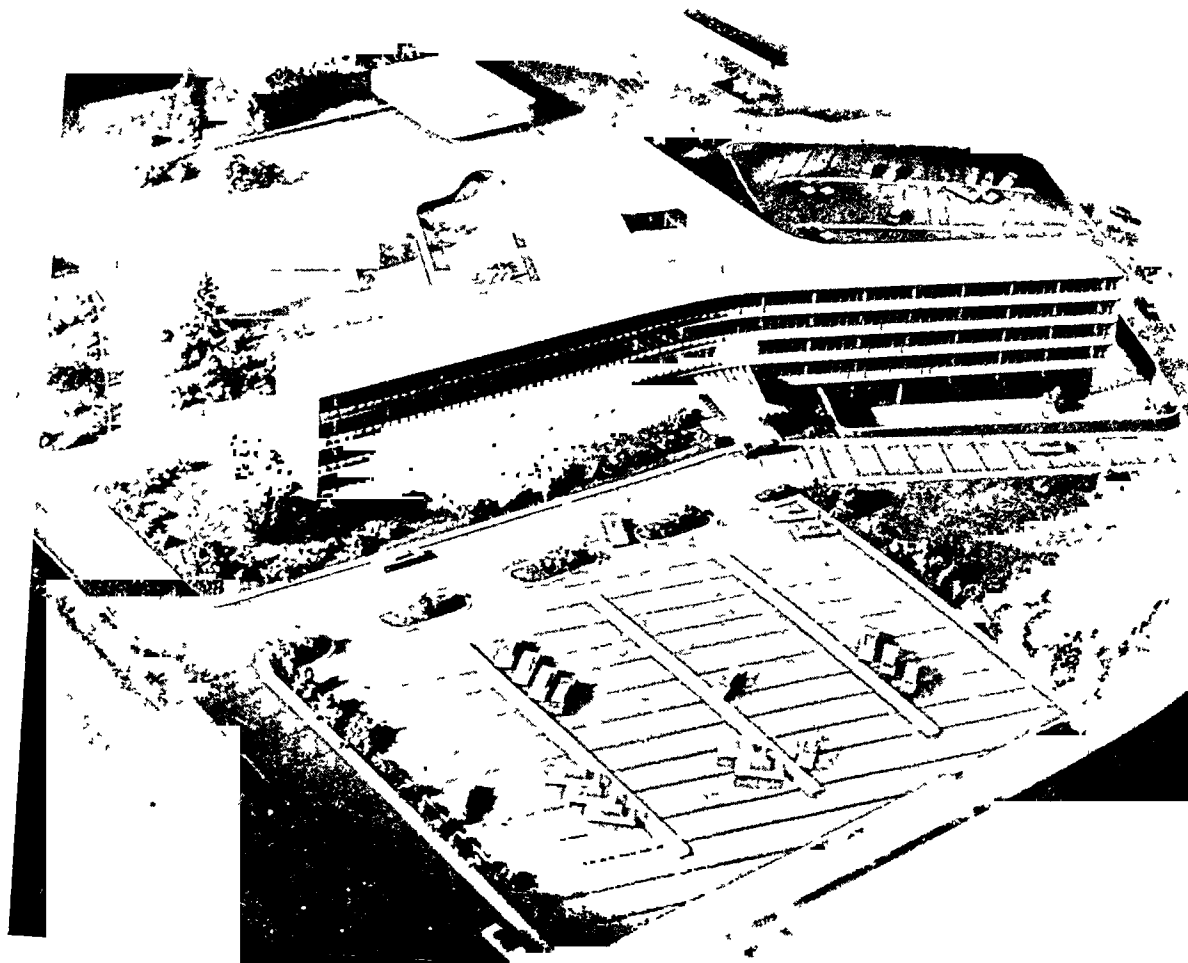
Water shortage increases the potential danger of the modern industrial environment. It is estimated that in only 20 more years our daily use of water will almost exactly equal our daily supply. And we recall that it was lack of water which caused the dissolution of the great civilizations of the Middle East.

In a way, we are modern Midases. Everything we touch and change adds to our wealth, yet in the process loses something of its intrinsic value.

Small wonder that we all live under the shadow of a haunting fear that something may corrupt the environment to the point where man joins the dinosaurs as an obsolete form of life. And what makes these thoughts all the more disturbing is the knowledge that our fate could perhaps be sealed 20 or more years before the development of symptoms.

Yet despite these ominous developments, there is an almost renaissance buoyancy in

Dr. Price, Assistant Surgeon General, Public Health Service, is chief of the Bureau of State Services. This paper is based on a text given at the 21st annual meeting, American Conference of Governmental Industrial Hygienists, in Chicago, April 27, 1959.



NEW INDIAN HOSPITAL

The hub of health and medical services for 81,700 Indians will be the new 200-bed Public Health Service Hospital in Gallup, N. Mex. Construction of the \$2,966,300 building, a modern four-story concrete and aluminum structure, will be completed in November 1960.

As the prime referral facility for 7 peripheral hospitals and 24 health centers and field stations in an area about the size of West Virginia, the hospital will serve Indians living on or near the Navajo Reservation in Arizona, New Mexico, and Utah.

Referral care will encompass not only the specialty surgical and medical services (diagnostic workup, cardiovascular diseases and gastroenterology, orthopedics, urology, gynecology, ophthalmology, and otolaryngology)

but also such specialties as neuropsychiatric and rehabilitation services which have not been available to any great extent for this Indian population.

The comprehensive outpatient department will provide complete and integrated medical care and preventive health services. The center's medical staff and consultants under contract will give specialty consultation to field personnel. The center will also serve as the training facility for the region for both hospital and field health personnel. It is anticipated that comprehensive internship and residency training will be developed in several specialties.

pollution loads tend to have higher than average death rates for certain diseases. This is a crude approach, however, and it will take a long time to study other factors which may be contributing to these findings and to determine the true significance of these observations.

The current community study in Nashville, Tenn., which involves both epidemiological observations and intensive sampling and analyses of air pollutants, is another research effort by the Public Health Service which seems promising.

Efforts to relate community air pollution to health may eventually have an effect on standards for the quality of air in the work environment. By the same token, studies of low-level exposures in the work environment may accelerate discovery of valuable clues to the hazards of community air pollution.

Probably the most publicized project in the Service's air pollution research is the study of automobile exhaust gases which is now being initiated at the Robert A. Taft Sanitary Engineering Center in Cincinnati. For this study, we are reproducing solar irradiation effects on diluted automobile exhaust gases and will expose both plants and animals to this environment. This is one of the most comprehensive studies of the automobile exhaust problem that has ever been attempted. Since many of the substances contained in automobile exhaust gases may also be emitted during metal cleaning operations, drycleaning, printing, and the manufacture of plastic, rubber, and other products, the yield in knowledge may be invaluable in controlling industrial health hazards.

Of more immediate significance is the training program. Since 1955, when the air pollution training program started, from 7 to 10 specialized courses, each lasting 1 or 2 weeks, have been given annually by the Public Health Service. More than 2,000 persons, chiefly engineers and chemists, have taken these courses. Most of them have been from public agencies, but a number have also come from private industry; in fact, last year one-third were from industry. The courses were originally given only at the Sanitary Engineering Center in Cincinnati, but for the past 2 years they have also been given in various other parts of the country.

There has been a growth in the number of colleges and universities establishing or strengthening air pollution courses. The Public Health Service has awarded 21 traineeships to students taking full-time graduate-level air pollution training and has awarded grants to 10 universities for graduate-level air pollution curriculums. This financial support for training, although relatively small, has given impetus to the whole training movement and, at present, 14 universities offer graduate courses for advanced degrees in subjects related to air pollution.

Through the Public Health Service alone, there are now three immediate sources of help.

First, a staff of specialists, physicians, engineers, chemists, and others who comprise our total air pollution program are available as consultants on new or unusual problems. We recognize that it is uneconomical for States and communities to employ regularly persons whose highly specialized skills would rarely be needed, but there is enough demand for such specialists to warrant the development of a central staff available wherever and whenever the need arises. Consequently, for the past several years, we have been recruiting such a group of specialists. They work with our regional consultants in meeting special needs.

Second, the trainees who attend Public Health Service courses and seminars form a reservoir of personnel available to State and local agencies.

Third, existing staffs from these agencies can increase their competency in the air pollution field by attending Public Health Service courses and seminars.

The National Conference on Air Pollution which met last November focused nationwide attention on the air pollution problem and I believe has stimulated industries and various other nongovernmental agencies to step up their activities in research, training, and control. Within government, the conference gave impetus to efforts to extend the Federal Research and Technical Assistance Act beyond its expiration date of 1960 and thus assure continued Federal assistance in grants to States, research, training, demonstrations, consultation, and other technical aid.

our outlook as we probe outward far into space and inward to the microcosm of the living cell. Stronger than fear is the conviction that what may at times appear to be the shadow of extinction is in reality the darkness preceding the dawn of the greatest era of progress man has ever known.

New Emphasis on Industrial Hygiene

Whether or not this proves to be true, industrial hygienists are in a peculiarly key position to predict, and in some measure to control, the nature of our future environment. Increasingly, the work environment will represent the world in miniature so that every advance in occupational health programs may contribute to advances in community health. Consequently, the problems of specific jobs have a wider significance than ever before. The day has passed when the industrial hygienist can discharge his duty by reducing the worker's exposure to concentrated toxic products. The industrial hygienist must now also be concerned about the gradual deterioration in health that may result from prolonged small-dose exposure to toxic materials. And since this is precisely the concern of those responsible for controlling the general community environment, it is not surprising to find that many States and communities are calling upon their occupational health personnel to assume major responsibility for newly developing programs in community air pollution and radiological health.

At the same time, occupational health programs cannot be neglected, as these facts clearly show:

- The 484 professional personnel staffing the 76 occupational health agencies in 40 States can cover only 10 percent of the Nation's work force.
- More than half of the industrial plants in the United States do not have even the most rudimentary type of occupational health program.
- Only about one-third of the Nation's workers are employed in large plants which may be able to afford the full range of preventive health services which is recognized to be desirable for all workers.
- Longstanding occupational health prob-

lems, such as silicosis, which we know how to control, continue to affect thousands of workers.

With so much unfinished business in established programs, one may well wonder how to meet new demands without spreading efforts too thin.

This is a question which concerns us in the Public Health Service and this is why our occupational and environmental health programs are developing and expanding those services which will be most helpful to States in meeting added responsibilities.

Air Pollution

The air pollution programs of the Public Health Service officially date from 1955 when the Federal Research and Technical Assistance Act authorized the Service to help alleviate the problem of community air pollution by providing grants-in-aid and technical assistance to States and by conducting and supporting research and training programs in the air pollution field. Actually, our work on air pollution began with work on occupational health. Industrial hygienists have always recognized that pollution of the air in the working environment is a hazard.

Removing noxious contaminants from the plant to the outside air has been a popular solution to the industrial aspect of this problem, but we are increasingly aware that it is not a satisfactory solution either for the plant or for the community. Our dissatisfaction stems from a growing realization that diluted amounts of toxic materials breathed over a long period of time may have harmful effects as surely as more concentrated amounts breathed over a shorter time period.

We do not, however, have conclusive evidence that this is true. One of the greatest needs in the air pollution field is epidemiological studies that will help us determine the effects of low-level exposures. Inplant studies as well as communitywide epidemiological studies could be most helpful. Through the air pollution research grants program, the Service hopes to encourage more epidemiological studies. Within the Service, we are comparing mortality and morbidity data with various indexes of air pollution and are finding that cities with heavy

pollution loads tend to have higher than average death rates for certain diseases. This is a crude approach, however, and it will take a long time to study other factors which may be contributing to these findings and to determine the true significance of these observations.

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The proceedings of the conference constitute an up-to-date reference book since it reports in full the papers given by some 90 authorities in industry, government, and other organizations, together with detailed discussion of papers by persons with varying viewpoints.

Radiological Health

The radiological health program of the Public Health Service has also been expanding rapidly and should become an increasingly valuable source of help in dealing with occupational health and even broader problems of radiation. A special Division of Radiological Health was established last year and is staffed with specialists in both medical and engineering aspects.

Like the air pollution program, the radiological health program conducts and supports research, carries on a training program with courses at the Sanitary Engineering Center and in other parts of the country, and provides consultation and technical assistance to States and communities upon request. Also like air pollution, the program, despite rapid expansion, still lacks sufficient staff and other resources to give as much help as one might wish.

Even if one considers only the occupational aspect of radiological health, its scope and predictable growth are truly formidable:

- It is estimated that 175,000 persons are currently employed in atomic energy industry. Thousands of other workers are engaged in operations involving the use of X-rays and radioactive substances.

- Two thousand hospitals and other institutions are licensed to use radioisotopes for medical purposes.

- A study underway by the occupational health program of the Public Health Service indicates that in at least one industry, uranium mining, the protections now available to workers are not yet adequate. About 64 percent of the miners in the Colorado plateau area, where most uranium mining is done, were found to be exposed to dangerously excessive concentrations, at least fivefold in excess of the desirable working standard.

The rapid growth in the past few years in the number of workers dealing with radioactive materials is as nothing compared with the

growth we shall see in the immediate years ahead. The tremendous task of learning more about the health hazards to the workers involved and of finding effective control measures must be shared by government at all levels and by industry.

Better application of existing knowledge, however, can accomplish much even now. We have recently had a dramatic demonstration of this among our own employees in Public Health Service hospitals. In July 1958, continuous film badge monitoring was initiated in most of the Public Health Service hospitals, outpatient clinics, and field medical units. More than 1,600 film badges have been worn for 1-month periods by personnel working in and around X-rays and other sources of radiation. Analysis of the film badge reports for August 1958-January 1959 indicates a progressive decrease in the number of badges which exceeded an exposure of 30 milliroentgens per week. This exposure is the practical maximum exposure which need not be exceeded by hospital personnel taking necessary precautions. Using this limit, 6.5 percent of the film badge wearers were overexposed the first 2 months and only 0.5 percent in the last 2 months, or a decrease from 31 to 3 needlessly large exposures.

Similar episodes could no doubt be recounted, for almost invariably a real drive to reduce radiation exposure of workers produces impressive results.

We are happy, therefore, to note that the States are exhibiting an increasing awareness and interest in the public health problem of radiation exposure. This is denoted in the increasing number of requests for consultative and technical assistance in coping with radiation problems, ranging from specific technical questions to assistance in development of comprehensive programs in radiation protection. Consequently, the following activities have been initiated in response to such expressed needs:

- Assistance in the development, organization, and operation of State health agency radiation programs. Such assistance is being provided by both headquarters and regional consultants, and, in some instances, by the assignment of trained Division of Radiological Health personnel to States on a full-time basis.

- Consultation on State legislation and rules and regulations for the control of radiation hazards.

- Demonstration projects on public health methods for the reduction of radiation exposure to the public from clinical use of X-rays.

- Technical aid in surveys and monitoring programs designed to determine the amount and effect of radioactive contamination and the extent of radiation exposure to our population.

- Assistance in evaluating the adequacy of proposed radioactive waste treatment and disposal mechanism in reactor facilities and in radioisotopes usages.

- Provision of information to communities near the site of reactor operations including: advice on the protective measures to be employed in connection with site selection; the outlining of laboratory or other radiation measuring methods considered necessary to determine the amount of radioactive contamination or exposure to individuals; and the proper interpretation of the results and effectiveness of various radiation protection methods or decontamination procedures.

The current program is in a transitional stage and, depending on the resources available to it, will develop in the coming months along lines best calculated to aid in the development of State activities.

Particularly significant to the future development of the radiological health program are the hearings which the Joint Committee on Atomic Energy is now conducting. The report of the Public Health Service National Advisory Committee on Radiation also suggests activity levels and assignment of responsibilities. Both documents deal extensively with the respective roles of Federal and State governments.

At the Joint Committee hearings 2 years ago, Merrill Eisenbud, manager of the New York operations office of the Atomic Energy Commission, pointed out that one reason why so many unanswered questions about radiation effects exist is that we know so much, rather than so little. "It is simply characteristic of good research that answers beget questions," he said, pointing to the disparity in the funds invested in radiation studies as contrasted with air pollution and other areas. He concluded that

if full information about organic chemicals and heavy metals were available, we should be asking the biologists many of the same kind of questions we are asking them today in regard to radiation effects.

Occupational Health Program Activities

It is imperative that we learn more about the new products that are being introduced so rapidly into general daily use in homes, farms, and factories. We realize, however, that the sheer number of chemicals being introduced each year as industrial compounds or intermediates precludes comprehensive toxicological screening. We in the Public Health Service also recognize that our own research efforts in this area have not kept pace with the problem and its needs. It is our hope that the toxicological and other activities of the occupational health program can be strengthened. The National Health Forum at its meeting in Chicago, March 17-19, 1959, strongly underscored the need for expanded Federal participation in occupational health activities. It particularly stressed the need for more epidemiological studies.

We believe that a first step in protecting the growing numbers of workers exposed to industrial chemicals is basic research to develop more efficient methods of toxicological evaluation. One such need is for the development of adequate testing procedures which will permit prediction with greater accuracy of the effects of long-term exposures. Also needed is the development of diagnostic procedures which, when applied to man, will detect changes long before permanent change has occurred.

The occupational health program has recently begun experimental work in this field of preventive industrial toxicology. The research which resulted in the discovery that vanadium poisoning can be detected by changes in the fingernails long before any clinical symptoms appear is the first fruit of a program that we hope will yield many other equally valuable findings in the coming years.

Another specific activity that we would like to strengthen is the occupational health information exchange. We hope to develop it into a central source of information on the toxicity

of chemical compounds, hazards associated with new processes, disease problems in industry, and control methods. The exchange was started rather recently on an experimental basis and seems to be meeting a long-felt need.

Emphasis will also continue to be placed on field studies, which are indispensable to occupational health progress. At present, the occupational health program has several studies underway which concern large segments of the working population. One of these concerns the effects of industrial noise on hearing, an extremely serious problem intensified by increasing off-the-job background noises. Another study, being conducted jointly with the U.S. Bureau of Mines in the western metal mines, seeks to determine how and where silicosis may be occurring. This problem remains the most significant occupational disease in terms of disability and compensation. Still continuing is the long-term study of radiation effects in uranium mining, to which I referred previously. These are just a few of the field studies which we hope will increase in number and scope.

Everyone in occupational health feels most keenly the great need to improve and expand our mechanism for collecting and reporting information on the health status of workers. Employee health programs, with periodic appraisals of health status, can contribute greatly to such epidemiological research. This is one strong reason, among many others, why we must find ways to reach workers in small establishments with employee health programs.

Basic Approaches

We need to develop a much larger amount of biological content in all programs that involve the environment. This can be done only if the engineer, the chemist, the biologist, the physician, and other specialists operate as a closely knit team.

Such teamwork is being fostered in every possible way within the Bureau of State Services. For example, in the Radiological Health Division, physicians and engineers develop policies and projects jointly. In the air pollution program, although organizationally separated, physicians and engineers share the same office

quarters in Washington and work in the same laboratories in Cincinnati, with the end result that there is joint planning and operation.

To strengthen such coordination at the administrative level, Mark D. Hollis, formerly chief of the Division of Sanitary Engineering Services, has been recently appointed associate chief of the Bureau of State Services. With his assistance as a member of my immediate staff, we expect to achieve an even greater degree of integration in engineering and medical programs. We hope to improve steadily our ability to channel, through our regional offices, whatever combination of medical, engineering, or other specialized consultant services may be needed in developing local programs.

In considering needs for future activity in the fields of environmental health, attention should be given to the published Hearings of the House Subcommittee on Appropriations which were released April 24, 1959. At the request of Chairman Fogarty, Congressman from Rhode Island, Dr. Leroy E. Burney, Surgeon General of the Public Health Service, emphasized the needs in the years ahead:

"In the present stage of thinking, it would seem desirable to establish some centers where orientation would be to particular problems of man in his environment and where research and studies of a specific type of community or industry, or environmental contaminant or influence could be carried out. Within these centers, technical assistance could be made available and training could be given in support of the total public health effort of the various components of the Service and of the States. . .

"Our planning for expansion of program and facilities at Cincinnati in sanitary engineering, air pollution, water pollution, occupational health, toxicology, and radiological health is quite advanced. We do not believe that all of the needs of the Service in these fields can be met at any one geographic site; nor that the total needs of the Nation should be met in Federal governmental facilities. It will therefore be prudent to plan for eventual development of a number of centers, utilizing, where feasible, established educational and research organizations."

Just as the team approach envisioned by Dr. Burney in this statement is the best way to study the complex problems of man and his environment so, I believe, the educational approach offers the best way of getting something done about them. The writing into law of maximum allowable concentrations and other

criteria can some day be helpful, when we are confident what such criteria should be. But more necessary than legal criteria are the educational efforts which prompt labor, management, and the general public to take voluntarily those actions which will contribute to a healthier environment for all.

PUBLICATION AND FILM ANNOUNCEMENTS

The publications and films selected for this list have been issued by or produced for State, local, voluntary, or other organizations associated with public health. Address inquiries to the publisher, sponsoring agency, or distributor.

To Your Health. Film on alcohol and alcoholism presented by the World Health Organization. Designed and directed by Philip Stapp. 16 mm., color, 10 minutes; \$100, including shipping in the United States. Center for Mass Communication, a Division of Columbia University Press, 1125 Amsterdam Avenue, New York 25, N.Y.

Rescue Breathing. Safety film teaching mouth-to-mouth and mouth-to-nose method of reviving suffocation victims. Written, produced, and directed by Lewis and Marguerite S. Herman. 16 mm., black and white or color, sound, 21 minutes, 24 seconds; 1 to 5 prints, black and white, \$110 each; color, \$200 each; reduction for 6 or more prints. American Film Producers, 1600 Broadway, New York 19, N.Y.

Current Research and Development in Scientific Documentation, No. 4. Compiled by Mrs. Madeline M. Henderson, National Science Foundation. April 1959; 85 pages; 15 cents. U.S. Government Printing Office, Washington 25, D.C.

Field and Clinical Survey Report of the Mental Health of the Indigenous of the Territory of Papua and New Guinea. Prepared by Alex. Sinclair, M.D., M.R.C.P., F.R.A.C.P. 1957; 59 pages. W. S. Nicholas, Government Printer, Port Moresby, Territory of Papua and New Guinea.

All the Years. A filmstrip depicting contributions of a community center to the lives of older people. 72 frames, black and white, with record and script, 15 minutes; \$9, including packing and shipping. Leo Seltzer Associates, Inc., 368 East 69th Street, New York 21, N.Y.

The Physician and Labor Health Plans. 1959; 18 pages; 20 cents. American Labor Health Association, 16 East 16th Street, New York 3, N.Y.

Toward Understanding Stuttering. By Wendell Johnson, Ph.D. 1959; 40 pages; 25 cents. National Society for Crippled Children and Adults, 2023 West Ogden Avenue, Chicago 12, Ill.

24 Hours Make a Year. Annual Report of the Council on Alcoholism, 1958-59. 1959; leaflet; no charge for single copies. Council on Alcoholism, Public Health Federation, 312 West Ninth Street, Cincinnati 2, Ohio.

Hints for Programs on Health. June 1959; 10 pages; no charge for single copies. Health Education Council, Public Health Federation, 312 West Ninth Street, Cincinnati 2, Ohio.

A Guide to Public Health Program Accounting. Prepared by the Committee on Program Budgeting and Accounting of the Association of Business Management in Public Health. December 1958; 83 pages; \$1. Mr. Ernest B. Davis, President-Elect, Association of Business Management in Public Health, Georgia State Department of Health, State Office Building, Atlanta 3, Ga.

VA Prospectus, Research in Aging. Transcription of a meeting of the Veterans Administration Advisory Committee on Problems of Aging and guest experts, edited by Dr. Charles C. Chapple. 1959; 125 pages; \$1.50. U.S. Government Printing Office, Washington 25, D.C.

Health in the Mexican-American Culture. A Community Study. By Margaret Clark. Study sponsored by the Rosenberg Foundation. 1959; 253 pages; \$5. University of California Press, Berkeley and Los Angeles.

Urban Sprawl and Health. Report of the 1958 National Health Forum. 1959; 228 pages; \$1.75. National Health Council, 1790 Broadway, New York 19, N.Y.

Radiation: Physician and Patient. Comprehensive film on diagnostic radiology: its biological effects, physical behavior, and proper use in clinical situations. Presented by the American College of Radiology in cooperation with the Public Health Service, supported by a grant from the Rockefeller Foundation. 16 mm., color, sound motion picture, 45 minutes. Prints can be obtained for professional use without charge from: American College of Radiology, 20 North Wacker Dr., Chicago 6, Ill.; American Medical Association, Film Library, 535 North Dearborn Street, Chicago 10, Ill.; Division of Radiological Health, Public Health Service, Washington 25, D.C.; any regional office of the Department of Health, Education, and Welfare, or any State health department.

Calendar of Health Department Events

A SIMPLE CALENDAR devised by the Calhoun County Health Department in Michigan has proved effective in helping all parts of the organization to anticipate forthcoming events.

Serving a population of approximately 142,000, the department has a staff of 32 persons in a ratio of 3 professional staff members to 1 clerical assistant. The total annual budget is less than \$190,000, of which \$165,000 is provided from county taxes by the board of supervisors.

Like its counterparts, the Calhoun County Health Department has certain established programs and responsibilities:

- Laboratory procedures.
- Home and traffic safety.
- Student affiliation.
- Civil defense.
- Staff education and meetings.
- Immunizations by triple antigen and poliomyelitis and smallpox vaccines.
- Reports.
- Mental health.
- Tuberculosis.
- Crippled children, school children, and maternal care.

In addition, there are established programs which must be accomplished on a seasonal basis within a short period of time, such as:

- Topical application of fluoride.
- Spring cleanup.
- Food establishment inspection.
- Trailer park and camp inspection.
- Immunization of school children.
- Nursing home inspection.
- Participation in meetings.

The department is also called upon to participate in certain campaigns and community activities which not only have value in themselves, but assist in the establishment of community

rapport. Examples are annual drives directed to public knowledge of diabetes, farm safety, fire prevention, spring cleanup, Christmas safety, and mental health.

The schedule of events entered on the calendar allows employees to evaluate the prospective workload at a glance. It gives a quick view of the periods of the year filled with scheduled activities and periods which conceivably may be used to develop a new program or emphasize existing programs.

Once it is fully determined that a scheduled program or event no longer has public health significance, it soon yields its place on the calendar to others.

The calendar is especially useful in planning public information campaigns, allowing time for gathering new and pertinent information and evaluating past procedures.

Also each division in the department becomes aware, in general terms at least, of the anticipated activities of other divisions, through use of the schedule of events. It alerts officials in many instances to opportunities for cooperation between divisions that might not otherwise be explored. Public health nursing and sanitation activities in particular have been coordinated by this process, so that they may share effectively in information services, or perhaps time their use of laboratory facilities at periods that are opportune.

A sample of the calendar, reproduced on facing page, is modified to meet the mechanical limitations of the printed page. The calendar used at Battle Creek is constructed to permit each user to write in a new or temporary project.

—GEORGE M. WATSON, M.S.P.H., consultant in health education, Calhoun County Health Department, Battle Creek, Mich.

Winter			Spring			Summer			Fall		
Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.
ADMINISTRATION											
							→	→		→	
SANITATION											
			→	→							
	→	→		→	→	→	→	→	→	→	→
		→		→	→	→	→	→	→	→	→
NURSING											
	→	→									
		→		→	→	→	→	→	→	→	→
		→	→	→							
			→	→							
LABORATORY											
										→	→
							→	→		→	
		→	→	→	→		→	→			→
							→	→			

Diagram (above) of the calendar the Calhoun County Health Department uses to note activities.
 Reproduction of the nursing section (below) shows typical entries.

NURSING				
Review the register	Review and re-locate cases		Pres. for Water Control Unit	→
Inspect Nursing Homes	Review Crippled Child Register			Participate in planning Topical Fluoride Program
Hearing Screening	→	→	Hearing Rechecks	Hearing Followup
Follow Up Cases & Crippled Child	→	→		→

NATIONAL
HEALTH
FORUM

mental health

of
the
worker

Mental health in industry was the subject of two panel sessions at the National Health Forum, held in Chicago, March 17-19, 1959, under the sponsorship of the National Health Council, with "The Health of People Who Work" as its general theme.

Participants in the panel discussion were: Dr. David H. Goldstein, medical director of the *New York Times*; Dr. Kenneth Munden, psychiatrist in the division of industrial mental health, Menninger Foundation; Richard C. Warren, director of education and personnel research, International Business Machines Corporation; Dr. Alan A. McLean, psychiatric consultant, International Business Machines Corporation; Dr. Ralph T. Collins, psychiatric consultant, Eastman Kodak Company; and Dr. James C. Conant, psychologist, Hanford Atomic Products Operations, General Electric Company. Dr. Collins and Dr. McLean were chairmen.

MENTAL HEALTH in industry presents a challenge to management. This challenge is no longer obscure. People have become quite familiar with the costs of treating the mentally ill, the shortage of trained psychiatrists, and the actions taken by many States in an attempt to improve the therapy of those stricken with mental illness and to further research into its causes.

Chairman Collins made these statements in opening a discussion of mental health in the industrial setting. He added the following facts:

- Emotional illnesses cause more absenteeism from work than any other illness except the common cold.

- Eighty to ninety percent of dismissals today are attributed to social incompetence, the inability to get along with people. Ten to twenty percent of dismissals are defined as technical incompetence.

- One of four workers, or 16 million of 65 million, manifest personality disturbances through absenteeism, accidents, alcoholism, illness, job dissatisfactions, or trouble with co-workers and supervisors.

- Off-the-job stresses loom large in the causation of on-the-job dissatisfactions, ineffectiveness, poor work habits, ineffectual relations, and faulty attitudes.

- The cost to industry of the disruption resulting from emotional disturbances among workers, supervisors, and executives runs into hundreds of millions of dollars annually.

- Leadership in the office and factory is a vital force in the promotion and preservation of mental health in the environment of the worker at any level.

- If he is to be a good leader, the health of the executive must be conserved, and yet today there are many pressures, frustrations, fears, and feelings of insecurity in his life. Consider the titles of some recent articles in business and popular magazines relating to the hazards of being an executive, such as "Slow Up or Blow Up," "Your Next Promotion Can Kill You," and "Must Executives Die Young?"

Collins underscored the importance of the total health of the worker, both physical and emotional, to the worker himself, the company

which employs him, and to his family and community.

Occupational Medicine

The objective of occupational medicine is to keep the working force as healthy and therefore as effective as possible, Goldstein said. And he added that the keystone of health maintenance is preventive medicine and case-finding.

In casefinding covering the whole host of physical and mental diseases, the plant physician is concerned primarily with early detection, particularly in mental illness, Goldstein continued. He knows that the earlier detection is achieved, the more likelihood of cure or if not cure, substantial amelioration, and the less disruption in the industrial community.

Goldstein described the plant physician as an unusual combination of personal physician to the employees during their working hours and health officer for the plant as a whole. In both capacities, he observed, there is opportunity for early detection of mental illness. As personal physician, he can relate physical and emotional stress to the total medical problem as employees seek his assistance, and as health officer, records and statistics permit him to observe, epidemiologically, the areas of excessive absences, accident frequency, or increased frequency of visits to his department.

As a means of casefinding in mental illness, Goldstein emphasized the advantage of educating supervisors to recognize symptoms. Support for this program, he said, should include a halt for medical appraisal, after a reprimand and before disciplinary action. The appraisal should be preceded by an interview with the supervisor. Deterioration in worker performance, especially when associated with personality change, always warrants referral to the medical department. He also pointed out the advantages of screening morbidity data for depressions masquerading as spastic colon, palpitations, fatigue, and noticeable weight change.

But the responsibility of the physician in industry goes beyond detection of mental illness alone into the broader area of prevention, Goldstein continued. As a member of the plant

community, the physician is free to discuss work attitudes and climate and, through these discussions, obtain understanding of human relations in the various departments. He appreciates the importance of and observes group behavior. He is aware that many companies have a "plant personality" to which employees attempt to conform.

Company policy, according to Goldstein, may invite employees of the type who thrive in a dependency relationship. Disturbances in supervision or job assignment of these dependent personalities may well develop stresses or even breakdown. He suggested that anticipation of such situations permits preventive measures.

In discussing the present emphasis on the executive position as a health hazard, Goldstein said scare headlines are "a bit overdone." He cited the results of a recent study by a large corporation, using heart disease, hypertension, and arteriosclerosis as stress manifestations, which showed an incidence somewhat lower in executives than in rank-and-file workers of comparable age and sex. He prefaced his remarks in this regard, however, by saying there is a rather extensive executive health program in operation at his plant and mentioning the value of the health appraisal and counseling part of these examinations.

In adopting what he termed a tangible and concrete approach to possible solution of certain mental health problems in industry, Goldstein discussed some of the specific procedures used by his company.

We must realize that throughout the United States the predominant occupational health service in industry is provided by the nurse, working alone, Goldstein said. It would be blind indeed, he added, to concentrate on the large plant medical service with an elaborate staff.

Through recognition, the nurse can take the first steps in handling employees with mental illness, he continued. If a doctor is available, either on call or on a part-time basis, she gives him a history of her reasons for referral. If she does not have a plant physician available, she can reach the employee's family physician, alert him to the situation, and at the same time encourage the employee to see his doctor. Both elements were considered essential by Goldstein.

The nurse has a variety of community resources available, he added, if the family physician is unwilling to assist or feels unequipped to handle psychiatry, if there is no family physician, or if the employee cannot pay for help. But her fundamental role is to recognize emotional disturbance and to encourage the employee to seek help.

He emphasized that the employee with mental illness must reach out for help; he cannot be directed to seek it.

In citing specific examples of help given by a medical department, Goldstein discussed first the "ever-present and too common" problem of alcoholism. In his plant, he said 2½ percent of the employees are identifiable alcoholics. He added that there are probably more, unknown to him.

Alcoholics have a tremendous need to see themselves in relation to people, he said, and we try to harness this motivation through a firm yet gentle approach, saying "Let's be realistic, you have a problem. Here are the avenues of help." In the case of a recognized problem drinker, Goldstein continued, job jeopardy is used in a system of warnings, in the hope this will motivate the man to seek assistance.

Sources of help suggested by Goldstein were the family doctor, Alcoholics Anonymous, and community resources. While listing the family physician as the frontline of defense in considering community aspects of depressions and severe psychoneuroses, Goldstein added that for the most part he will not assist in treatment of alcoholism.

Preventive psychiatry appropriately used was discussed by Goldstein as another example of good mental health practices in industry. Retirement shock is a familiar term today, he said, stating that it is his belief that the dazed, apathetic, and withdrawn attitude of individuals verging on retirement or newly retired can be avoided through counseling. His organization, he said, routinely schedules informal discussions with employees between 6 months to 2 years prior to retirement. The individuals without resources outside their job are the most likely candidates for retirement shock, and it is these individuals who can be helped through counseling.

Goldstein explained his company's procedures in the return to the work area of a patient cured of a mental illness. He elaborated on the consultative techniques between the hospital psychiatrist and the plant physician in evaluating the demands of the job, saying that the advice of the psychiatrist is followed in most instances, in modifying either the work itself or the hours of work. He pointed out that these efforts are not always successful, but without these techniques, the patient might never be returned to work.

Goldstein recognized that there are only a handful of industries in the United States employing a psychiatrist full time. Recognizing that it would not be practical for many to do so, he advocated use of the part-time psychiatrist on a consultative basis.

Considering that the use of community resources is dictated by cost and the limitation of employee's funds, he saw encouraging developments in the area of insurance, such as major medical care programs and group policies, taken out by labor and management or management alone or paid cooperatively.

Goldstein stressed the importance of preserving the confidential nature of medical information in a company setting. Obvious outbreaks cannot be concealed, but referrals for subtle manifestations must be preserved as a confidence. The value of maintaining this information as privileged was related by Goldstein to the number of employees coming to his department for help.

While it is axiomatic that the industrial medical department appreciate its responsibility in the area of mental health, Goldstein said, it is equally axiomatic that if the whole program is to succeed, management must endorse and support the medical department.

Research

There are two ways of looking at mental health problems in industry, Munden said.

We can enumerate symptoms, such as those implied in alcoholism, absenteeism, accident proneness, promotion neurosis, and occupational reactive depressions—a palliative and purely symptomatic approach not in keeping

with medical tradition that diagnosis precedes treatment.

Or we can look beneath the surface at the forces in industry which tend to impair mental health, such as failure to provide identification models, interference in interpersonal relationships, or demands on people beyond their individual capacities or skills with a resultant failure to come to psychological fruition.

Munden related these forces, which he said precipitate symptoms through deflating self-esteem to a feeling of worthlessness, to three factors: reluctance to act, power relationships, and the impact of change.

He mentioned perceptive executives, who understand the effects of motivation very well but who hesitate or are reluctant to put their knowledge to use by satisfying the desire to be heard, to be recognized. The classic denial of opportunity for individual recognition persists along with the custom of giving a watch for 30 years of service, even under an informed management.

Failure to recognize the meaning of power held over others creates another problem area, Munden indicated.

Living is a system of power relationships and dependencies, he said. We start life dependent upon those more powerful than we—our parents. From then on, any person in a position of authority is the "father figure."

People have conscious expectations of being protected, helped, supported, and guided by the authority figure. They also have unconscious expectations of which neither they nor the person in power is aware. Knowledge of such power relationships and their proper use means that a supervisor appreciates his role fully.

Technological changes are occurring so rapidly that it is difficult to keep up with them, Munden said. It is assumed that people can change as easily, accepting the dictum, for example, that automation does not mean loss of a job and that there will be no fears and anxieties or disbeliefs of such a dictum.

He pointed out the example of the difficulties of middle-aged people in accepting changes in job techniques or increased responsibilities, their feeling being that they cannot change, even while they complain.

The Health of People Who Work

Sponsored by the National Health Council and its more than 65 member agencies, the National Health Forum on "The Health of People Who Work," held in Chicago, March 17-19, 1959, was attended by approximately 600 persons from the States, Hawaii, Puerto Rico, and Canada.

Seventeen groups discussed such areas of occupational health as provision of a healthful working environment, preparation for retirement, mental health, health education, communication, mobilization of resources, programs for small plants, and costs relating to worker health. At the close of the 3-day meeting, representatives of labor, management, the professions, and the voluntary and official agencies summarized suggestions for improving the health of workers, their families, and their communities.

Throughout the sessions, an underlying theme was the need for new colleagues—from management, labor, the health professions, and the voluntary and official health agencies—to join the

industrial physician, hygienist, and nurse in the common interest of occupational health.

It was forcefully brought out that official agencies, national, State, and local, have not yet developed adequate programs in the field of occupational health. Among other recommendations, speakers urged that sufficient funds be allocated; that all official agencies, as employers, provide occupational health programs for their employees, thereby setting an example for voluntary agencies and for private industry; that official agencies take a more active part in conducting multiple-industry, large-scale epidemiological studies; and that guidance be given especially to the development of occupational health programs for employers with relatively small numbers of employees.

A full report, entitled "The Health of People Who Work," based on transcript records of discussions by the more than 200 specialists attending the forum and edited by Albert Q. Maisel, is scheduled for publication by the National Health Council in October 1959.

Munden stressed the error of treating symptoms as problems. He emphasized that this in itself is one of the biggest hazards to good mental health practices in industry.

He warned industry against placing matters of human relations in the hands of nonexperts. These nonexperts have lives entrusted to them, holding power over the occupational future of individuals, he said.

Get help when interested in employees who come to you with troubles, Munden urged. Mental health problems cannot be tackled alone.

As a typical situation, he cited the industrial nurse who has to deal with employees drifting in and out, obviously seeking something and taking up her time in aimless conversation. She can't change the world and the plant by herself, he said, but she respectfully can demand aid. He said local mental health agencies would respond, naming State hospitals as a source of psychiatric assistance on a consultative basis.

Munden admitted that few psychiatrists are

interested in the industrial area, since their first interest is in cases. They will take a referral but are reluctant to visit a plant and discuss mental health practices.

Techniques used to stimulate interest in industrial psychiatry at the Menninger Foundation were described by Munden. He said that about 10 percent of psychiatric residents in this country are trained at the Menninger School of Psychiatry. A seminar on industrial psychiatry was initiated in 1955 and has been held yearly since then. Interest was shown but the reaction was negative on the whole. In 1957, visits by residents to nearby plants were begun, with the cooperation of the medical departments. Most residents were amazed and responded positively to this new program orientation.

Munden suggested that this approach would be useful in stimulating interest among local psychiatrists and mental health associations.

Recognize the problem and get the help available, was his closing admonition.

Education

An industrial setting is not appropriate for direct psychotherapeutic activity, Conant said. It is a place where we can identify problems and see that proper care is prescribed. It is in the more important role of prevention that the psychologist makes his contribution, he stated. The industrial community inherits the problems of its society. Since mental health is one of society's major problems, so it is industry's. People bring to work their cares and anxieties, their alcoholism, and their concern about their children. The industrial social order can provide gratifications which reduce these stresses or it can nurture dissatisfactions, which become imbedded, take root, and flourish in the industrial soil. The objectives of an educational program are to aid in providing the knowledge and tools to create a desirable atmosphere.

Conant emphasized the importance of management decisions on the mental health climate. Even casual comments often are taken quite seriously. He cited the example of the manager who indicated to one group that their house-keeping could be improved. Several groups immediately set other work aside to clean house, irrespective of priority, because "the old man is on a house-cleaning kick."

Thought given to the effect of management decisions can be a powerful tool in improving the climate and lessening the aggravation of people's emotional problems.

Another problem area was labeled by Conant as that of "conflicting needs." He referred to management's attitude of "what's good for the organization is good for the people," without recognition of the divided loyalties and conflicting needs of people. In citing examples, he told of the manager who gave a low rating to employees who left exactly at closing time, thereby imposing an unrealistic standard in view of their responsibilities to their families and communities. He also mentioned the people who, though paid on a piecework basis, curtail their production rather than incur criticism by their peers.

We sometimes make people feel anxious and inordinately guilty, Conant said, oftentimes quite unnecessarily, by failure to recognize their conflicting needs and to help in resolving them.

Conant said the training program at his plant is aimed at three levels of understanding how people think, feel, and act.

The orientation course, labeled "Understanding People," includes seven 2-hour sessions once a week. An additional session at the initiation of members is called a "self-analysis experiment." With their full consent, members anonymously take a personality test. They also predict their individual scores on ten traits, based on guides that are provided. They then indicate what they wish they were like. The answers yield a self-concept and a concept of ideal self, in addition to the test results.

The test results provide a fairly accurate measure of what the individual members are like in relationship to people in general, he continued. It is followed by individual discussions to interpret the results. Personal problems can be discussed and counseling or referral for treatment given.

Conant stressed this is not a technique-oriented or "how to" type of training. Rather it aims at greater insight into behavior and allows for individualization of approach. As supervisors and managers understand human needs better, especially the impact of their own psychological makeup, they are better able to establish a work climate conducive to more effective adjustment. From management's viewpoint, increased productivity and creativity are significant by-products.

The second course, "Interviewing Techniques," is designed to improve skill in handling people, Conant continued. He said much of the work of supervisors and managers requires the ability to "bridge the perceptual chasms of our experience and their experience." The training given is designed to help people learn to listen, to help them realize when they are not listening, and, if possible, to understand why they have not listened. Interviews are role played, tape recorded, and then analyzed by the group. Recorded examples are also played to demonstrate how someone else handled the situation.

As a result, the group becomes extremely sensitive to the importance of interpersonal dynamics, not only to the words spoken but to the facial expression, gestures, and mannerisms

which indicate whether or not the other person is listening, Conant said. The course is very popular with management, he added, mainly because they feel they learn techniques in two-way communication and in giving emotional first aid. He said guidelines are given for not "getting in too deep," and emphasized that the medical department is always available for consultation and referral.

The third course, still in the trial stage with a volunteer group of 10 persons, Conant described as a workshop in self-understanding. It attempts to get even farther away from the "how to" type of presentation and more into the "why" of behavior. The course provides "situations" and then assesses reactions to each of them. Discussion is devoted to comparison of the different reactions among the group members. The purpose is to show the importance of a person's attitudes on his interpersonal relationships—his impact on others, and the impact of others on him; the role of unconscious motivations in behavior; and the effect of childhood experiences on the development of personality. Preliminary results are encouraging.

Conant said 60 percent of his time is spent in training, and he reviewed the various ways training leads him into consultation with management; assessment of employee morale, consultations about individuals, personal counseling, employee relations problems, and the like.

In summary, Conant said he feels psychologists within the industrial medical department are making pioneer strides in preventive mental health which in 10 years will bring advancement in this field throughout large industrial concerns.

The Management Viewpoint

I think every management development program is directed toward a climate conducive to minimum frustrations and maximum effectiveness on the job, Warren said. Certainly, efforts to define jobs, to determine areas of authority, to establish performance criteria, and to improve man-manager relationships are attempts to let the worker know where he stands and feel more secure in his position and in his

relationship with his co-workers in the plant and in the management hierarchy.

One of the questions plaguing management in its efforts to run a business with healthy people is, "How sick is sick?" he said. No one is completely healthy mentally: it is a matter of determining the optimal degree of mental health within any organization.

Warren challenged the assumption that 1 of 10 persons need treatment. Use of these figures is equivalent to lumping the common cold with tuberculosis, he said. In a preventive mental health program, we should address ourselves to cases that give evidence of being acute, rather than trying to be all things to all people.

He admitted the difficulty of providing guides to a manager in the early detection and referral of incipient mental illness. In so doing, he said, we must preserve the primary function of business, avoiding a climate of "mental hypochondria." We must not permit overtones of mental illness to so becloud personnel actions as to make administration all but impossible.

An educational program in the prevention of mental illness within his company was described by Warren, who credited McLean as its creator. Endorsement of the program by division general managers was obtained before it was inaugurated in plant areas, he said.

Essentially, the program seeks to alert management at all levels to the facilities which can be brought to bear in dealing with a disturbed worker and to provide guideposts for managers in referrals. Managers attended a series of conferences on mental health which included on the program the professional psychiatrist, the plant physician, the plant personnel manager, the psychologist, and the plant general manager. The desired result was obtained, he said, since they presented a concerted story on mental health with the backing of the professional staff and management.

Management can do much, he added, to improve mental health through internal research within the company and widespread dissemination and use of the results of research being conducted outside the company. By making full use of these experiences in decisions and establishment of policy, Warren said, management is leading from as much strength as it can.

Psychiatry's Role

Some mental health problems at work are obvious and easily recognized, McLean stated. Incidence of mental illness, environmental influence on the emotionally disturbed employee, and loss of productivity, income, and manpower are in this category, he said.

But there are other less clearly recognized factors, he added. They range from the meaning of work to the individual to the more subtle factors in a work situation which may trigger, not cause, symptoms of mental illness. They encompass the mental health of individuals at work but are not regarded ordinarily as doing so.

McLean referred to Conant's discussion of the anxiety aroused in employees through policies, procedures, situations, and even personalities within a company. He said promotions, demotions, job transfers, and assignments with a different supervisor can be contributory factors in mental illness.

As an example, McLean cited the case of an executive who, on returning to work after a physical illness, was promoted to a position of greater responsibility. He reacted with a major depression requiring months of hospitalization and care. The executive, insecure as a result of his physical illness, was given no alternative but to accept the promotion, which obviously contributed to his breakdown.

Learning a great deal more about why and how changes on the job influence mental health becomes one of the major problems in industry today, he said.

No psychiatrist in industry can function successfully without management's support. Neither can he function optimally without skilled and perceptive physicians in the medical department or medical consultants fulfilling this role in the community. And no mental health program can succeed without emphasis on both education and research, McLean concluded.

Psychiatry's role in industrial mental health is relatively new, Collins said.

Tracing the work of pioneers in the field, he said the first psychiatrist in industry, Dr. C. Charles Burlingame, started with the Cheney Silk Mills in Manchester, Conn., in 1914. Dr. E. E. Southard, professor of psychiatry at Harvard, worked with the Engineering Foundation

in 1920 on a number of surveys. And from 1925 to 1929, Dr. V. V. Anderson, as a consulting psychiatrist with Macy's Department Store, defined job qualifications and job placement, matching these factors to personality, job, and dexterity capabilities. He also did considerable work in emotional and followup therapy, with the assistance of visiting and public health nurses, and, at the same time, wrote "Industrial Psychiatry," the only textbook ever published on the subject.

During World War II, industry called on psychiatrists to assist in getting out the product and bolstering morale, Collins recalled. But this was a temporary expedient resulting in dismissals at war's end.

Later came the new era in mental health programs in industry, when psychiatrists were hired on a sound medical basis, he said.

Today the psychiatrist plays many roles in industry, with his own and other companies, with local and national mental health societies, with personnel and supervisors, Collins stated.

He emphasized the role of the psychiatrist as a teacher. Nurses, physicians, and supervisors learn to interpret employee behavior from the psychiatrist. They learn that it is not a personal attack when a patient glowers, is sarcastic, and shows hostility. They are taught they stand for something in the patient's life and experience which has brought on revolt. And they are taught to listen. Collins said professional medical personnel are trained to be active, to do things, and to order patients to do things, and they question the value of just listening. The psychiatrist teaches them to listen without prejudice or bias.

Counselors working in an ancillary capacity to supervisors urge troubled employees to seek the advice of the supervisor and the medical department. The psychiatrist does not see anyone unless referred by the medical department, he added. This avoids putting diagnostic responsibility on the shoulders of the supervisor. Otherwise word is likely to get around the department that "you'd better go easy, or Joe will send you to Collins and he'll pick your brains." This is not good mental health or education.

Collins said psychiatrists have a responsibility to further education in industrial

psychology outside the company area. A questionnaire sent out in a magazine asking for information from those interested in the subject brought more than 180 replies from psychiatrists working about 2 hours a week as consultants in industry.

The psychiatrist in a community is also a citizen, Collins stated. He illustrated the value of the assistance given local mental health societies by referring to the Camden Mental Health Association which invites supervisors to attend monthly meetings on such subjects as

"Understanding Your Emotions." By methods such as this, psychiatrists help management to understand behavior.

Most psychiatrists agree there is need for greater awareness of individual needs by management and medical personnel in industry, McLean said. Understanding the fundamentals of normal personality functions can bring greater understanding of much unexplained behavior. And if applied, it can lead to a healthier company and a healthier individual within its organization.

Epidemiological Notes

Clostridium perfringens

A food poisoning episode occurring under nearly ideal conditions for expert investigation has yielded a clue which may enable health officials to determine the cause of similar outbreaks in the future. At present, the causes of about 100 of the more than 200 food poisoning episodes reported annually in this country are unknown.

A species of bacteria known as *Clostridium perfringens* was identified by the Public Health Service in both food and human specimens collected during the investigation of the episode. These bacteria are reported to account for about 25 percent of food poisoning cases in England but have not been considered a hazard here and consequently are not included among the bacteria most laboratories are equipped to identify.

The episode which yielded the new clue occurred on April 8, 1959, aboard a Washington-bound train from Toledo, when more than 100 delegates to an AFL-CIO conference on unemployment complained of stomach cramps and diarrhea several hours after eating a turkey dinner.

Because the outbreak occurred on an interstate carrier and thus came under Federal jurisdiction,

the Public Health Service as well as the District of Columbia Health Department sent specialists to the scene shortly after the first symptoms were reported.

Samples of food were sent to the milk and food research laboratories in the Robert A. Taft Sanitary Engineering Center in Cincinnati. Subsequently, specimens collected from crew members and several passengers were also tested in these laboratories.

At the same time, an epidemiological investigation was conducted by epidemic intelligence officers from the Communicable Disease Center in Atlanta. This investigation included a questionnaire which was sent to 450 passengers to obtain more details about the episode. Of the 300 who replied, 160 listed symptoms indicative of *C. perfringens* food poisoning.

Laboratory findings correlated almost exactly with the clinical findings. *C. perfringens* organisms, as well as large numbers of enterococci bacteria, were found in samples of the turkey dressing.

Since some authorities believe that large numbers of either of these organisms may cause the same type of food poisoning, the Service has arranged for additional tests by the Walter Reed Army Medical Center in Washington and by Dr. Barbara Hobbs, an expert on *C. perfringens*, in London, England.

It will be several months before these additional tests are completed. However, the findings of *C. perfringens* in this outbreak has led to speculation as to whether it may be a frequent cause of food poisoning in the United States. The Public Health Service has alerted health officials to use Service facilities to check suspect outbreaks. It is also developing information materials, since there is little on this subject in American medical and public health literature.

Florida's Citizens Medical Committee on Health

RECOMMENDATIONS

WILSON T. SOWDER, M.D.

RECOMMENDATIONS for strengthening health programs and services in the State of Florida were submitted to the Governor by a Citizens Medical Committee on Health in January 1959. The committee was appointed by the Governor in April 1958 at the suggestion of the State medical association. It had 22 members, 18 of whom were physicians, all but 3 in private practice. There were two legislators, a hospital administrator, and the executive secretary of the State medical society.

Including meetings of the four subcommittees, there were seven sessions, all with virtually a 100 percent attendance. A variety of detailed studies were outlined by the committee and conducted with the aid of a designated staff. The recommendations were evolved by subcommittees and as revised had the unanimous approval of the committee as a whole.

It is practicable here only to outline the nature of the studies and of the recommendations. For those with particular interest, a limited supply of the published report is available from the State health officer, Jacksonville, Fla.

Chronically Ill and Aged

One subcommittee directed its attention to the medical care of indigents with chronic diseases and to the health and care of the aging.

As an example of studies conducted, there was a complete survey of all inmates of nursing homes and of the nature of the care available in these homes. There was a study of 8,474 representative hospital admissions and of 1,590 patients who remained in general hospitals for 15 days or more. Outpatient services currently available in the State and the nature and distribution of available ancillary home care services were examined. These studies resulted in nine recommendations which began as follows:

"Though this committee has directed its attention predominantly to provision of medical care to the chronically ill and aged, it recognizes and emphasizes the importance of health promotion . . . [It encourages] a wider and specialized interest by medical practitioners and health officers in the health needs of the aged." The recommendations continue:

"In this country it is accepted that the responsibility for medical care rests properly with the individual and family, with services provided by freely selected physicians. An essential element of this plan is prepayment and distribution of costs through voluntary insurance. . . . It is, therefore, recommended that through every practicable channel the medical

Dr. Sowder, a member of the Citizens Medical Committee on Health, is the health officer of Florida.

societies and official agencies encourage the development and promote the use of voluntary medical and hospital insurance which will extend benefits to the aged and cover other than short-term illnesses. . . ."

There was a long and detailed recommendation pertaining to the development of ancillary home care service. It was recognized that insofar as practicable the aged and those with chronic diseases should be cared for in the familiar environment of the home. The recommendation emphasized the responsibility of both the official and voluntary health agencies in developing and providing home nursing and rehabilitative services.

Individual recommendations pertained to the provision of outpatient care of chronic diseases, to the improvement of nursing home care, and to the provision of hospitalization for the indigent. These recommendations were designed to meet specific needs revealed through the studies of the committee, and the methods recommended involved extensions or modifications of programs now in effect in the State. There were some original approaches; for example, the recommendation "that a conference of church leaders be convened by the Governor to explore and define the responsibility of Florida's churches in providing services to the aged." Specific recommendations as to the respective roles of the State board of health and the State department of public welfare in the provision of medical care were offered. The committee held the opinion that the responsibility for the administration of programs of medical care should be in the hands of the medically directed department. Cooperative planning to this end was urged.

One recommendation clearly revealed the broad outlook of this committee: "It is the guiding conviction of this committee that responsibility for the health and medical care of the indigent should be centered as close as practicable to those to be served." The committee discussed tax sources which would permit the State and the local community "to plan and support medical and health services in accordance with programs evolved by the State to best meet its needs." It mentioned the possibility that the social security program might permit States to combine the present programs for

medical care to the categorically indigent into a single medical program administered by a single health agency.

State Agencies

A second subcommittee gave detailed attention to the medical and health services provided by the various State agencies. The purpose was to reveal any unnecessary overlapping of activities or any deficiencies and to consider possible improvements in plans for the administration of all State medical and health programs. In the main this subcommittee offered a commendatory report with helpful suggestions. It stated:

"The committee is favorably impressed with the variety and amount of needed medical and health services provided through official agencies to the people of Florida. They commended the agencies for the generally smooth and effective cooperative relationships. There is no significant amount of overlapping or duplication of services at State level. With a program distributed through 13 agencies there could be obvious imbalance but this was not evident. Despite these generally favorable observations, it also is clear that there are possibilities for improvement in organization and in operations."

A general recommendation of the committee was that in future planning any wider dispersion of medical and health responsibilities should be avoided. Future development should be in the direction of consolidation. Two specific recommendations dealt with tuberculosis; one pertained to medical care in the State prison system, and another emphasized the urgent need for improved facilities for the institutional care of the mentally ill, particularly for the care of psychotic children.

The committee expressed dissatisfaction with the diverse nature of plans for the provision of hospital and medical care to eligible individuals at State expense. It was their hope that similar procedures could be evolved in programs for the provision of medical care to the categorically indigent, the medically indigent, crippled children, those being assisted through vocational rehabilitation, and others provided care at the taxpayers' expense. Attention was

given to the school health program, which they considered appropriate and satisfactory, and to the urgent need of increasing activity in accident prevention. Three recommendations are of such interest to public health that they are reported in the words of the committee:

"While fully acknowledging the necessity and importance of public welfare the committee is gravely concerned with the seeming lack of any defined limits to the activities of welfare agencies. Any worthy project can be conducted in the interest of public welfare. This committee is convinced that health and welfare agencies have different and distinctive missions and that there must be a proper assignment of responsibility and authority, particularly for medical and health services. The committee holds that services provided by the medical professions and particularly for medical care in or out of the hospitals should be the responsibility of medically directed organizations. It is to be emphasized that in these activities a close working association with the medical professions must be established and maintained, and that medical judgments are essential for sound administration. While the detailed planning of inter-agency relationships is beyond the scope of this committee's activities, it does recommend further study and consultation by the agencies involved to define areas of responsibility for medical and health problems in the public welfare, public health, and in other State agencies. This is considered essential as a basis for sound and productive cooperative working relationships.

"While there is at State level a dispersion of responsibility for broad medical and health problems, this committee holds strongly that at the local level there should be a consolidation of all community health programs for the protection and promotion of health, physical and mental. It is noted with satisfaction that the department of education and the board of health through joint planning have evolved commendable plans whereby the county health departments give the health services needed in the school health program. It is recommended that other agencies, particularly the Crippled Children's Commission, the Council for the

Blind, the Industrial Commission, and the alcoholic rehabilitation program, consider comparable programs. In the opinion of this committee, the county health departments should be so strengthened that local health services needed by various State agencies could be provided through sound cooperative planning and action. In view of the costs of travel and the maintaining of multiple regional offices, the committee is satisfied that the recommended consolidated activity at the local level will result in savings and in increased efficiency.

"It is recognized that the present sound pilot programs for the treatment and prevention of alcoholic addiction are designed to evolve effective measures which eventually may be applied on a county or community basis. Since the future hope is for effective prevention it is recommended to this end that consideration be given to developing at an early date a local pilot preventive program incorporated as a part of the activities of some selected county health department."

Other Recommendations

The study of the voluntary health agencies was revealing. It had not been appreciated that the income provided voluntarily by the citizens of the State for health programs materially exceeded the total appropriations from all counties for public health work. While the committee recognized the importance of the work of voluntary health agencies, it appeared to them that activities would be more productive with effective coordination among the voluntary health agencies themselves and with closer cooperation with the professional societies and public health bodies. There was concern with the multiplication of voluntary health agencies, and it was recommended that for the protection of the public's investment and the favorable reputation of the agencies some appropriate registration and some public accounting and reporting be required.

Attention was given also to possible means for attaining a more effective distribution of medically trained and ancillary personnel.

Concerning one of the newest health problems, it was recommended that a medical committee on radiological safety, a majority of

whose members would be qualified radiologists, be designated to serve in an advisory capacity.

Conclusion

These broad and comprehensive recommendations are of particular significance since they come from what is usually considered to be a rather conservative professional group. It is

a source of gratification that a representative group of practicing physicians in Florida who were appointed by the Governor in response to a suggestion of our State medical association committed themselves to such a liberal and progressive public health program. It is expected and believed that their recommendations will be given serious consideration in the months and years ahead.

PHS exhibit

The Migrant Worker

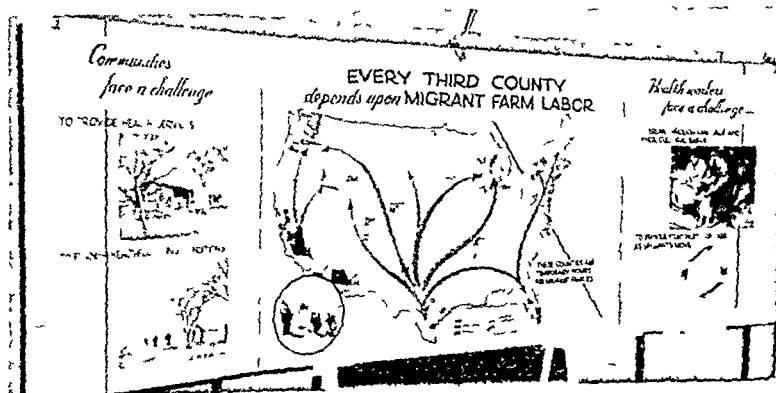
Information supplied through this new Public Health Service exhibit on migrant workers is designed to encourage organized community effort in meeting the health problems of domestic agricultural migrants on a continuing basis.

The exhibit emphasizes the challenge to communities of providing adequate housing and health care as well as the challenge to health workers in overcoming language and

other cultural barriers to communication with migrants, and in developing methods of providing continuity of services as they move.

Designed for display at national, regional, and State conferences, and other places where interested people gather, the exhibit is available for loan without charge, exclusive of shipping charges.

Further information, including arrangements for borrowing, can be obtained from the Program Development Branch, Division of General Health Services, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington 25, D.C.



Specifications: A 3-panel exhibit on legs, 7 feet high, total weight 375 lbs., including the packing crate, center panel 4 by 6 feet; each of the side panels, 4 by 3 feet, attached to the center by hinges. Lighting fixtures are attached to the panels at the top, and the three 300-watt reflector floodlights can be connected with a single outlet.

1958 Summary of Disease Outbreaks

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THE PATTERN of foodborne and waterborne disease outbreaks in 1958 did not differ greatly from that of the previous years (table 1). However, a closer inspection should be made of some aspects of the pattern. For instance, there is no convincing evidence that staphylococcal food poisoning and foodborne *Salmonella* infections are becoming less frequent.

The decline in number of outbreaks and cases of staphylococcal food poisoning reported in 1958 and in 1957 compared with previous years is more likely to be due to failure in reporting than to a reduction in this type of illness (table 2). Two outbreaks involving cheese were among the reports received in 1958. In one outbreak cases occurred in two adjoining States receiving shipments of cheese processed in another State. Staphylococci were isolated from samples of the cheese obtained from the distributor and the factory. Furthermore, the organism was found in milk from dairy herds supplying milk to the cheese factory. Some strains of staphylococci isolated from samples of milk were resistant to certain antibiotics. The second outbreak occurred in an institutional population that had been supplied with cheese manufactured in the same State.

A review of reports received in past years shows that staphylococcal food poisoning associated with fluid milk, dried milk, and cheese is not uncommon. It is also known that bovine mastitis caused by staphylococci is common. Furthermore, the indiscriminate use of some

antibiotics in the treatment of mastitis has favored the development of strains of staphylococci that are resistant to the antibiotics. Therefore, there is need to investigate more thoroughly many aspects of the whole problem of staphylococci in milk and milk products and to study the relationship between staphylococcal infections in man and animals. More intensive studies of outbreaks should also be made when milk or milk products appear to be vehicles of infection.

Fewer cases as well as fewer outbreaks of foodborne *Salmonella* infection were reported in 1958 than in 1957. The numerous sources of infection reported emphasize the wide distribution of these organisms, particularly in animals and animal products, such as meat and eggs (table 3). In one outbreak caused by *Salmonella dublin*, infection was traced to a certified raw milk dairy. Laboratory examination revealed the presence of this organism in specimens of feces of a dairy farm employee, but *Salmonella* organisms were also isolated from three cows in the dairy herd. In another State, employees on a dairy farm presumably were infected by contact with cows that had diarrhea. *Salmonella typhimurium* was isolated from both cattle and men that were ill.

Salmonellae were isolated from shell eggs and frozen egg whites in several epidemics and from packages of a powdered scrambled egg product. Numerous outbreaks were reported following the eating of chicken and turkey meat, especially the latter. In others, food handlers were the probable source of infection. A number of cases of salmonellosis were traced to contaminated well water, seldom reported as a source. The wide distribution of *Salmonella* and the possibilities for spread in a community are indi-

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cated by a summary prepared by the health department laboratory service of a large western city. Twenty-seven different subtypes of the organism were isolated from 209 persons in 1958. These subgroups included 10 in group B, 11 in group C, 3 in group D, 2 in group E, and 1 in group G. Seventy-two strains of *S. typhimurium* were isolated, 23 of *Salmonella saint-paul*, 16 of *Salmonella oranienburg*, 14 of *Salmonella newport*, 13 of *Salmonella montevideo*, 11 of *Salmonella infantis*, and 10 of *Salmonella give*. The same variety of types has been reported where laboratory diagnostic services are extensively utilized.

Since only a fraction of the outbreaks caused by staphylococci and salmonellae and by other organisms appear to be reported, the real extent of the foodborne diseases is unknown. Year after year the same few States report the majority of the outbreaks summarized in these annual reports. Other States report a moderate number, and some report none. The reports from certain large cities are conspicuous by their absence. More complete reporting is needed not only for measuring the magnitude of the problem but also to show what is needed for improvement in food handling facilities and practices and for planning more effective control programs. Furthermore, the food industry is fourth largest of all industries in the United States, and the quality of its products is the direct concern of all persons.

The various categories of foodborne and waterborne disease outbreaks reported in 1958 are discussed and tabulated in the same manner as in the report for 1957.

Waterborne Outbreaks

Only four outbreaks were demonstrated to be due to contaminated water. An outbreak of shigellosis followed failure to chlorinate the public water supply of a small city for several days while the water inspector was out of town because of illness in his family. Another outbreak of shigellosis occurred in a group of campers who drank inadequately treated water from a livestock watering tank. The other two outbreaks included salmonellosis resulting from the use of a polluted well and gastroenteritis due to contamination of a public water supply,

Table 1. Foodborne and waterborne disease outbreaks reported in 1958, by vehicle of infection

Area ¹	Water		Milk and milk products ²		Other foods ²	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
United States...	4	445	13	441	236	9,925
New England:						
Maine.....					5	183
Massachusetts.....					13	425
Rhode Island.....					2	101
Connecticut.....					2	43
Middle Atlantic:						
New York.....	1	11			17	747
New Jersey.....					4	470
Pennsylvania.....					3	947
East North Central:						
Ohio.....					1	45
Indiana.....			3	124	7	694
Illinois.....					5	223
Michigan.....			1	21	3	342
Wisconsin.....					1	43
West North Central:						
Minnesota.....					3	36
Iowa.....			1	200	1	60
Missouri.....	1	61			3	85
South Dakota.....					2	16
Nebraska.....			1	5		
South Atlantic:						
Maryland.....					1	61
Virginia.....					1	16
West Virginia.....					6	17
North Carolina.....					3	347
South Carolina.....					2	391
Georgia.....					3	196
East South Central:						
Kentucky.....					3	60
Mississippi.....					2	234
West South Central:						
Louisiana.....			1	31	2	23
Oklahoma.....					2	141
Mountain:						
Idaho.....					1	32
Colorado.....	1	350			1	5
New Mexico.....	1	23				
Pacific:						
Washington.....					2	64
Oregon.....					5	120
California.....			6	60	130	3,758
United States 1957...	1	131	8	67	250	11,085
United States 1956...	9	1,719	31	873	210	11,133

¹ States not listed submitted no reports.

² Includes outbreaks among military personnel.

Table 2. Foodborne, waterborne, and other disease outbreaks reported in 1958, by type of infection

Area ¹	Typhoid fever		Salmonellosis ²		Shigellosis		Trichinosis		Botulism		Staphylococcal food poisoning ²		Streptococcal infections		Gastroenteritis, etiology unknown ²		Toxic agents	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
United States----	1	30	27	1,043	3	392	7	68	3	4	62	2,291	2	598	134	6,216	14	169
New England:																		
Maine-----							1	4			1	5			3	174		
Massachusetts-----			3	177							2	142	1	12	7	94		
Rhode Island-----			1	4											1	97		
Connecticut-----			1	3											1	40		
Middle Atlantic:																		
New York-----			5	164							3	130			9	458	1	6
New Jersey-----															4	470		
Pennsylvania-----							1	7							1	840	1	100
East North Central:																		
Ohio-----							1	45										
Indiana-----											6	749			4	69		
Illinois-----											2	108			3	115		
Michigan-----			2	277							2	86						
Wisconsin-----			1	43														
West North Central:																		
Minnesota-----							1	9			1	20					1	7
Iowa-----											2	260						
Missouri-----					1	19									3	127		
South Dakota-----			1	7											1	9		
Nebraska-----			1	5														
South Atlantic:																		
Maryland-----											1	61						
Virginia-----											1	16						
West Virginia-----							3	3			1	5			2	9		
North Carolina-----			1	140					1	1	1	206						
South Carolina-----															2	391		
Georgia-----			1	58											2	138		
East South Central:																		
Kentucky-----									1	2					1	38	1	20
Mississippi-----											1	34			1	200		
West South Central:																		
Louisiana-----			1	31											1	22	1	1
Oklahoma-----															2	141		
Mountain:																		
Idaho-----															1	32		
Colorado-----					1	350					1	5						
New Mexico-----					1	23												
Pacific:																		
Washington-----											2	64						
Oregon-----											2	6						
California-----	1	30	9	134					1	1	33	394	1	586	3	114		
United States 1957-----	4	70	30	1,607	11	754	1	14	6	12	58	1,660			135	6,065	8	68
United States 1956-----	7	52	23	1,999	8	1,107	11	98	11	22	111	4,313	4	1,030	88	6,688	9	160

¹ States not listed submitted no reports.

² Includes outbreaks among military personnel.

Table 3. Outbreaks of certain foodborne diseases reported in 1958, by type and source of food

Source	Salmonellosis		Shigellosis		Staphylococcal food poisoning		Streptococcal infections		Gastroenteritis, etiology unknown	
	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected	Number of outbreaks	Number of persons affected
Type of food										
Poultry.....	8	162	0	-----	6	214	0	-----	28	1,672
Other meat.....	1	58	0	-----	31	651	1	586	44	975
Custard-filled dessert.....	1	23	0	-----	6	40	0	-----	5	234
Salad.....	0	-----	1	19	8	825	0	-----	6	204
Other.....	6	442	0	-----	9	471	1	12	17	438
Not determined.....	10	347	0	-----	2	90	0	-----	33	2,632
Total.....	26	1,032	1	19	62	2,291	2	598	133	6,155
Source of food										
Public eating establishments.....	10	117	0	-----	17	214	1	12	30	316
Private clubs.....	1	40	0	-----	1	141	0	-----	4	68
Schools.....	1	140	0	-----	3	840	0	-----	8	516
Colleges.....	0	-----	0	-----	1	65	1	586	5	326
Hospitals and institutions.....	4	191	0	-----	4	321	0	-----	8	2,418
Recreation camps.....	0	-----	0	-----	0	-----	0	-----	4	162
Labor camps.....	0	-----	0	-----	0	-----	0	-----	7	432
Social gatherings.....	4	185	0	-----	7	285	0	-----	9	273
Bakery caterers.....	1	24	0	-----	1	8	0	-----	3	235
Private homes.....	2	28	0	-----	16	215	0	-----	34	234
Transportation.....	0	-----	0	-----	1	2	0	-----	1	10
Other.....	2	39	1	19	10	180	0	-----	16	880
Not stated.....	1	268	0	-----	1	20	0	-----	4	255
Total.....	26	1,032	1	19	62	2,291	2	598	133	6,155

although the manner in which the supply was contaminated was not determined.

Milkborne Outbreaks

Milk and milk products were considered the source of infection for 13 outbreaks. Cheese and cheese spreads were implicated in five outbreaks, several of which occurred only among members of individual families. The outbreaks involving Cheddar cheese have been described.

Thirty cases of salmonellosis were traced to raw milk from a certified dairy. In this episode a bottle washer continued to work at his job while he was ill. About a week after the onset of his illness, a stool specimen was found to be positive for *S. dublin*. In another State,

five cases of salmonellosis were thought to be due to milk from a small uninspected dairy. An outbreak of salmonellosis in a hospital was traced to malted milk, but raw eggs used in the preparation of the milk drinks may have been the primary source of infection. Another outbreak in a hospital, not included in the milkborne category, was thought to be due to eggs used in making eggnog. Investigation revealed the flock which supplied the eggs was infected.

Reconstituted dried, nonfat milk was the source of infection for 15 cases of gastroenteritis in a labor camp. Not included in the milkborne category was an outbreak of 75 to 80 cases of gastroenteritis, thought to be due to milk served from dispensers in a university dining room. But this could not be proved, and milk

obtained several days later from the dispensers did not show evidence of contamination.

Typhoid Fever

Only one outbreak of typhoid fever was reported during 1958 in which food or drinking water was incriminated. The organisms recovered from the ill persons were phage type E₁. However, several other episodes of typhoid fever were reported. Three boys became ill with typhoid fever after swimming in a stream which carried untreated sewage. The organism in this instance was also phage type E₁. In another instance, six cases with one death occurred over several weeks in a slum community which did not have public water and sewerage facilities.

Salmonellosis

Twenty-seven outbreaks of salmonellosis were reported in which laboratory confirmation was made either by isolation of organisms from the food, from the stools of the ill persons, or from food handlers. Four of the outbreaks were related to ingestion of chicken meat and four to turkey meat. The source of the food for 10 of the outbreaks was public eating establishments. Eleven species of *Salmonella* organisms were isolated. Among these were *S. typhimurium* in seven instances and *S. dublin*, *Salmonella sandiego*, and *S. saint-paul* in two outbreaks each.

Several other outbreaks were reported, but no foods were thought to be involved. *Salmonella reading* was isolated from a package of powdered egg product which was served at a Boy Scout ranch, but no cases resulted.

Shigellosis

Three outbreaks of shigellosis were reported. Two resulted from contaminated water supplies and the other from a tossed salad. The responsible organism in each instance was *Shigella sonnei*.

Shigella flexneri 2a was found to be responsible for a number of cases of shigellosis which occurred over a 2-week period in an unsanitary labor camp. And *S. flexneri* 4 was responsible

for an outbreak in a boarding home for children, but no common source of infection was found in either episode.

Trichinosis

In two of the seven outbreaks of trichinosis reported during 1958, the source of infection was homemade pork sausage. In another, it was pork sausage prepared by a local butcher. In a fourth outbreak, dietary histories indicated that ham had been eaten. Investigation revealed that the ham itself probably was free of viable *Trichinella* and that contamination could have taken place by the addition of raw pork. In this outbreak 78 persons developed symptoms of trichinosis, and about 45 of these gave definite laboratory evidence of recent infection.

Botulism

Four cases of botulism were reported. Two persons became ill after eating home-canned string beans which had been discarded by another family because they looked spoiled. The beans were heated in a skillet before serving. *Clostridium botulinum* was identified morphologically and culturally from the original jar of beans. One other case resulted from eating home-canned mushrooms, and no particular food was incriminated in the illness of the fourth person.

Staphylococcal Food Poisoning

Most of the 62 outbreaks of staphylococcal food poisoning occurred following meals in public eating establishments and private homes. The foods most often involved were meats other than poultry. Eclairs and custard-filled desserts were proved by laboratory tests to be the vehicle of infection in only six outbreaks.

Gastroenteritis, Etiology Unknown

More than one-half of the total waterborne and foodborne outbreaks were of unknown etiology. Poultry and other meats were the suspected vehicles in 72 of them. The two most frequent sources of infected foods were public

eating establishments and private homes. Usually food samples were not available for laboratory examination, and, when specimens were obtained either from the food or from the ill persons, the results were negative or inconclusive for food-poisoning organisms.

Chemical Poisoning and Noxious Foods

Five reports of chemical or noxious food poisoning, each affecting only a few persons, were related to the ingestion of wild mushrooms. Another report stated that 20 children became ill when a dining room was sprayed with an insecticide while the group was eating. Several other outbreaks of chemical poisoning

resulted from contamination of punch drinks with metals from the containers in which the drinks were stored. Zinc, antimony, and copper were the metals involved.

In two instances beef and French doughnuts were found to be contaminated, and in another instance a number of persons became acutely ill while eating soup in a restaurant. Investigators thought the illness was due to chemical poisoning, although there was no definite evidence of such contamination. One case of lead poisoning resulted from ice used in alcoholic drinks. The ice was stored in a chest which had a lead slab lining the bottom, and chips of the lead were scooped up along with the ice.

Drugs and the Newborn

Newborn mammals lack the ability to alter drugs into inactive products, investigations at the National Heart Institute, Public Health Service, indicate.

Dr. Bernard B. Brodie, Dr. W. Robert Jondorf, and Dr. Roger P. Maickel of the Institute's Laboratory of Chemical Pharmacology found that the enzymes located in the liver microsomes which are required to inactivate drugs are absent in newborn mammals during the first week of life. They also found that the central nervous system of the newborn is extraordinarily sensitive to barbiturates.

The researchers compared the ability of mice and guinea pigs of various ages to metabolize several commonly used drugs. Guinea pig livers were homogenized and incubated with various test drugs, including aminopyrine, phenacetin, hexobarbital, phenolphthalein, and monomethyl-4-aminoantipyrine. The experiments showed that the drug-destroy-

ing enzyme systems are absent in fetal and newborn guinea pigs, but appear during the first week of life and require about 8 weeks to develop fully. The liver incubation studies were confirmed by demonstrations that live, newborn mice are unable to metabolize aminopyrine, phenacetin, or hexobarbital.

An additional potential danger of giving drugs to the newborn was observed in studies of hexobarbital action. Very small doses (10 mg./kg.) put 1-day-old mice to sleep for 360 minutes, and 7-day-old mice for 107 minutes. Adult mice napped for less than 5 minutes under the drug's influence.

"That newborn mammals are unable to metabolize these compounds is of obvious importance in considering the use of drugs in childbirth and for newborn infants," the scientists said. They also stressed the importance of making detailed studies of drug action in newborn infants.

Health Insurance and Hospital Use Related to Marital Status

AGNES W. BREWSTER and LUCY M. KRAMER

THERE threads through the work of the Social Security Administration a concern with the family status of the persons whose lives its programs may affect. In that respect it is unlike many agencies of government whose relations to people are more remote and impersonal.

Social security benefits are payable not only to insured retired workers but also to their wives and to widows and surviving children of insured persons as well. Old age assistance caseloads contain large numbers of widows and widowers. Aid to dependent children is frequently needed because the absence of a parent has disrupted the family. In its studies of various income maintenance programs for which it is responsible, the Social Security Administration is constantly examining family status. Similarly, questions of levels of expenditures need to be related to family status since expenditures have significance according to the number of persons the family income must support.

Expenditures for sickness and for the maintenance of health, like other consumer expenditures such as food and clothing, are influenced by family size and family income. To some degree the medical expenditures may be gov-

erned by selections the family can make, such as postponement of care, or care at home in lieu of hospitalization. However, other medical care expenditures, such as those for maternity, generally are consequent to the establishment of a family, and the choice as to avoidance or postponement is limited.

British (1,2) and Canadian (3,4) studies have demonstrated differential use of hospitals as between single and married persons, with single persons making greater use of hospitals.

According to the recent study of Britain's National Health Service by Abel-Smith and Titmuss, "Compared with the demands made by single men and women (and, to a lesser extent, the widowed) the proportion of married men and women in hospital even at age 65 and over is extremely small. . . . For all types of hospital and in relation to their numbers in the total adult population, the single, widowed, and divorced make about double the demand on hospital accommodation compared with married people. . . . Marriage and its survival into old age appears to be a powerful safeguard against admission to hospitals in general and to mental and 'chronic' hospitals in particular" (1a).

Table 1 summarizes the result of a one-time hospital population count made in England and Wales as part of the regular British decennial census. Abel-Smith and Titmuss drew three major conclusions from this table: (a) among both sexes with advancing age the proportion in hospitals in England and Wales at the time of the census rose most sharply for the single, less so for the widowed and divorced, and least for the married; (b) among

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Table 1. Percentage of 1951 census population in all National Health Service hospitals in England and Wales by age, sex, and marital status

Sex and age group (years)	Marital status		
	Single (percent)	Married (percent)	Widowed and divorced (percent)
<i>Male</i>			
0-14-----	0.6		
15-44-----	1.4	0.3	.7
45-64-----	5.9	.6	1.3
65-74-----	6.6	1.0	1.8
75 and over-----	8.5	1.5	3.2
<i>Female</i>			
0-14-----	.5		
15-44-----	1.4	.6	.7
45-64-----	3.5	.7	.9
65-74-----	3.8	1.2	1.4
75 and over-----	5.9	2.4	2.9

SOURCE: Reference 1b.

the married, even at age 75 and over, the proportion in hospitals was 2 percent or less of the population; (c) at all ages the proportion of men, single, widowed, and divorced, in hospitals was higher and rose more sharply than the corresponding rates for women (1b).

Table 2 shows the average days of stay in Saskatchewan, Canada, hospitals in 1957 by age, sex, and marital status. In every age and sex category but one, the average length of stay is less for married persons than for single, widowed, divorced, or separated persons. In the one excepted category, men 45 years and over, the length of stay is the same for married as for widowed, divorced, or separated men, but both are less than the stay for single males.

These findings are of interest to those sectors of the Federal Government concerned with factors in the cost of sickness and the price of health. In the experience of Great Britain and Canada, two countries with a national health insurance program, the economic cost to an individual family is not a factor in hospital utilization. It is apparent, then, that factors other than income are in part responsible for differences in levels of hospital usage. For example, living arrangements, levels of health, ownership of health insurance, and similar conditions, some of which are related

to income and to marital status, also affect the amount of hospital care used.

The regular monthly Current Population Survey of the Bureau of the Census in September 1956 had a supplement on insurance coverage and hospital utilization. This afforded an opportunity to explore some facets of the use of hospitals in the United States by married and nonmarried (single, divorced, or widowed) persons. The household sample, on a national scale, was drawn from the civilian noninstitutional population living within the continental United States. About 27,000 households comprising approximately 90,000 persons were included. Excluded were members of the armed services, inmates of mental or penal institutions, and residents of homes for the aged, infirm, and needy. The findings which resulted are the subject of this study.

Before analyzing hospital utilization by the married and nonmarried in terms of various other factors, it is necessary to examine the extent to which health insurance protection is available to the married and the nonmarried sectors of the population. Under our system of voluntary health insurance, availability of health insurance to many women may be dependent on their status as a spouse.

HEALTH INSURANCE OWNERSHIP

Differences in the number of noninstitutionalized persons having health insurance in any given population group are to be expected, given the variety of conditions and techniques for enrollment of members and their dependents. Differences in the extent of group coverage relate to the degree of urbanization and industrialization of a community, and hence to the availability and cost of group policies. Age, income, and similar factors affect the proportions of the population insured under nongroup arrangements.

Extent of Ownership

Table 3 indicates that there is little difference based on sex in the extent of enrollment per 1,000 in the group under age 65, and in the whole population group. The census findings for September 1956 show improvement since the earlier

Table 2. Average days of stay per year in Saskatchewan, Canada, hospitals by age, sex, and marital status, 1957

Sex and age group (years)	Marital status		
	Single	Married	Widowed and divorced
<i>Male</i>			
15-24.....	7.7	6.5	11.5
25-44.....	11.4	8.1	12.0
45 and over.....	19.3	14.0	14.0
<i>Female</i>			
15-24.....	7.4	6.3	10.2
25-44.....	10.9	7.5	9.0
45 and over.....	17.6	13.6	18.3

SOURCE: Department of Health, Province of Saskatchewan: Annual Report of the Saskatchewan Hospital Services Plan, 1957, p. 15.

surveys of 1952 and 1953 in the relative position with respect to health insurance ownership of aged women compared with aged men.

Surveys made in 1952 and 1953 of persons with insurance by various characteristics provide comparative data for measuring the differential rates of growth in coverage. The March 1952 survey was made by the Bureau of the

Census for the Division of Program Research, Social Security Administration, and encompassed the population aged 65 and over (5). The July 1953 survey covered the population of all ages and was made for the Health Information Foundation by the National Opinion Research Center (6).

Aged women, particularly those who are not married, are relatively poorly covered according to the September 1956 findings. Although in the corresponding group of aged unmarried men the rate per 1,000 is even lower, married men aged 14-64 achieved the largest degree of health insurance coverage of any of the segments into which the September 1956 population has been divided. (The segments are age, sex, race, labor force status, marital status, and income levels.) The rate for this group, married men aged 14-64, was above the rate per 1,000 for the white population per se and for the entire working force population. In the 14-64 age group there were 25 more insured persons per 1,000 recorded among married men than among married women. The rate is particularly noteworthy since the analysis of hospital utilization by different population groups,

Table 3. Number of insured persons per 1,000 by race, labor force status, marital status, and age, September 1956

Sex and age group (years)	Total	Race		Labor force status		Marital status	
		White	Nonwhite	In the labor force	Not in the labor force	Married	Not married ¹
Both sexes.....	636	670	353				
Under 14.....	641	686	331				
14 and over.....	634	664	365	681	567	685	521
14-64.....	671	705	382	691	637	710	574
65 and over.....	365	379	173	502	320	430	296
Male.....	640	673	359				
Under 14.....	640	684	338				
14 and over.....	640	668	371	681	451	691	513
14-64.....	674	706	389	691	543	723	547
65 and over.....	392	408	181	508	311	442	277
Female.....	632	667	347				
Under 14.....	642	688	323				
14 and over.....	628	659	358	681	596	679	527
14-64.....	669	704	376	689	654	698	597
65 and over.....	342	355	166	483	324	409	305

¹ Includes single persons, widowed persons, and persons who are divorced or separated from their spouses.

SOURCE: Bureau of the Census Current Population Survey, September 1956.

which will be discussed later, shows that this high rate of insurance coverage applies to a group whose need of hospitalization appears to be below average as indicated by the volume of hospital care used.

Table 3 also shows marked differences in rates of health insurance ownership when the white population is compared with the non-white population, especially when persons over age 65 are compared. Thus, while 670 white persons per 1,000 of all ages were insured, only 353 nonwhite persons per 1,000 were insured. And in contrast to 379 white insured persons aged 65 and over, only 173 nonwhite persons in this age bracket were insured per 1,000.

Participation in the labor force is also linked to health insurance ownership, with more significant differences among men than women. In the age group 14-64, 691 men per 1,000 in the labor force were insured compared with 543

per 1,000 not in the labor force. Among women in the same age group, the numbers insured were 689 per 1,000 in the labor force and 654 per 1,000 not in the labor force. The closeness of these two figures results from the fact that many women not in the labor force are covered through their husbands' employment. This is demonstrated by the fact that, of the women in the age bracket 14-64 who were married, 698 per 1,000 were insured, compared with 597 per 1,000 insured who were not married.

In general then, of the total of 636 persons per 1,000 in the population of all ages who owned health insurance in September 1956 (table 3), there were larger numbers among the white race, among those in the labor force, and among the married than among the non-white, the nonworker, and the nonmarried. The group with the greatest health insurance coverage, 723 per 1,000, were married men aged

Table 4. Percentage distribution of sex and age groups in the population by health insurance coverage and scope of benefits, September 1956

Sex and age group (years)	July 1, 1956, population (in thousands)	Percent insured, by scope of insurance				Percent not in- sured
		Total with in- surance	Hospitali- zation only	Hospitaliza- tion plus sur- gical expense ¹	Other ²	
Both sexes.....	165, 339	63. 6	8. 3	49. 3	6. 0	36. 4
Under 14.....	47, 915	64. 1	7. 1	50. 3	6. 7	35. 9
14 and over.....	117, 424	63. 4	8. 9	48. 8	5. 7	36. 6
14-64.....	103, 017	67. 1	8. 9	52. 1	6. 1	32. 9
65 and over.....	14, 407	36. 5	8. 5	25. 1	2. 9	63. 5
65-69.....	5, 440	47. 6	10. 5	33. 1	4. 0	52. 4
70-74.....	4, 139	36. 3	7. 8	25. 8	2. 7	63. 7
75 and over.....	4, 828	23. 7	6. 8	15. 2	1. 7	76. 3
Male.....	80, 598	64. 0	8. 3	49. 7	6. 0	36. 0
Under 14.....	24, 437	64. 0	7. 3	50. 2	6. 5	36. 0
14 and over.....	56, 161	64. 0	8. 8	49. 5	5. 7	36. 0
14-64.....	49, 511	67. 4	8. 8	52. 5	6. 1	32. 6
65 and over.....	6, 650	39. 2	8. 8	27. 1	3. 3	60. 8
65-69.....	2, 612	49. 8	10. 6	34. 7	4. 5	50. 2
70-74.....	1, 916	39. 5	8. 6	27. 4	3. 5	60. 5
75 and over.....	2, 122	25. 3	6. 8	17. 1	1. 4	74. 7
Female.....	84, 741	63. 2	8. 3	48. 8	6. 1	36. 8
Under 14.....	23, 478	64. 2	6. 9	50. 4	6. 9	35. 8
14 and over.....	61, 263	62. 8	8. 9	48. 2	5. 7	37. 2
14-64.....	53, 506	66. 9	9. 0	51. 7	6. 2	33. 1
65 and over.....	7, 757	34. 2	8. 2	23. 4	2. 6	65. 8
65-69.....	2, 828	45. 5	10. 3	31. 6	3. 6	54. 5
70-74.....	2, 223	33. 6	7. 1	24. 5	2. 0	66. 4
75 and over.....	2, 706	22. 5	6. 8	13. 7	2. 0	77. 5

¹ May include persons who also have in-hospital medical benefits.

² Hospitalization and surgical expense insurance plus other benefits.

SOURCE: Same as for table 3.

14-64; the group with the least protection, 166 per 1,000, were aged nonwhite women.

A summary of the proportion in each age-race group who had some form of health insurance at the time of the summary shows that 94 percent of the insured were white. Of the 4.9 percent who were insured and over 65 years, only 0.2 percent were nonwhite.

<i>Age and race</i>	<i>Percent distribution</i>	
	<i>Insured</i>	<i>Not insured</i>
All ages-----	100.0	100.0
White-----	94.0	80.7
Nonwhite-----	6.0	19.3
Under 14 years-----	29.7	29.0
White-----	27.7	22.2
Nonwhite-----	2.0	6.8
14 years and over-----	70.3	71.0
White-----	66.3	58.5
Nonwhite-----	4.0	12.5
14-64 years-----	65.4	56.0
White-----	61.5	44.9
Nonwhite-----	3.9	11.1
65 years and over-----	4.9	15.0
White-----	4.7	13.6
Nonwhite-----	0.2	1.4

Table 4 presents the proportions in each age-sex group who were insured in September 1956 for hospitalization alone and for hospitalization and additional benefits. The group insured for hospitalization and additional benefits is subdivided into those reporting surgical expense insurance (possibly also with some protection against nonsurgical medical expenses in the hospital) and "other," those whose insurance appeared to the interviewer to include more benefits than the local Blue Cross-Blue Shield plan or the typical insurance company policy. Persons whose protection was through accident-only policies, travel-accident policies, or medical expense insurance under automobile liability policies were not counted as insured. Persons in the category labeled "other" in table 4 are all assumed to be insured against the costs of hospital care as well as against surgical and medical expenses. The table shows that 55 percent of the population had insurance covering other benefits as well as hospitalization, 8 percent had insurance limited to hospitalization, and about 36 percent had no insurance of any kind at the time of the interview.

As of the September 1956 survey, nearly two-

thirds of those in the age groups under 65 had insurance, but only 36 percent of the population aged 65 and over were insured. Of the insured aged, roughly one in four had only hospitalization insurance, whereas among insured persons under 65 only one in eight had benefits limited to hospitalization.

In the remainder of this study, persons are considered insured or not insured without further delineation of the scope of their benefits. The proportion of those insured in any age group who had only hospitalization insurance should be kept in mind. Those ratios by age groups are:

<i>Age group (years)</i>	<i>Percent of insured with hospitalization only</i>
All ages-----	13.1
Under 14-----	11.1
14-64-----	13.3
Under 65-----	12.6
65 and over-----	23.2
65-69-----	22.0
70-74-----	21.0
75 and over-----	28.6

Insurance and Income Status of the Aged

Data were analyzed according to family income for the aged persons interviewed in the

Table 5. Number of insured per 1,000 persons aged 65 and over by sex and by family status according to annual income, September 1956

<i>Annual income</i>	<i>Rate for both sexes</i>	<i>Rate for male</i>	<i>Rate for female</i>
<i>Primary family</i>			
All income groups---	386	415	357
Under \$3,000-----	312	318	284
Under \$1,000-----	174	193	154
\$1,000-\$1,999-----	323	345	297
\$2,000-\$2,999-----	432	468	394
\$3,000 and over-----	468	509	425
\$3,000-\$3,999-----	461	491	430
\$4,000-\$4,999-----	462	478	450
\$5,000 and over-----	477	534	426
<i>Primary individual</i>			
All income groups---	307	309	306
Under \$1,000-----	195	171	203
\$1,000-\$1,999-----	379	337	401
\$2,000-\$2,999-----	468	434	481
\$3,000 and over-----	548	557	543

SOURCE: Same as for table 3.

survey (table 5). In census terminology, persons living in a family headed by a person related to them by blood, marriage, or adoption are members of "primary family units." The income shown for the family unit in which the aged person lives is not necessarily that of the aged person but would include his income. In the household interviews information was also obtained on the annual income of individuals not living with any relatives, "primary individuals."

Comparatively few aged persons living in families with low incomes were found to be insured. Only 174 per 1,000 aged persons in families whose incomes were under \$1,000 reported having health insurance. When family income was \$5,000 or more, 477 per 1,000 aged were insured.

Although family income was not necessarily

the income of the aged person, the family income in many instances was that of an aged couple. However, the fact that the proportion of women insured was not highest in the \$5,000 and over class may reflect the relatively large number of aged women who live in the households of relatives other than their spouse.

Table 5 also shows the proportion insured when the income reported was that of aged persons classed as "primary individuals." No one in these households was related to the head, so the income shown in all instances is that of the aged person. Among individuals with less than \$1,000 in annual income, about one in five was insured. When their income exceeded \$3,000 annually, more than half of the aged individuals reported owning health insurance.

Insured aged persons were fairly evenly distributed at each level of family or individual in-

Table 6. Percentage distribution of the insured and the uninsured noninstitutional populations 65 years and over by sex and other selected characteristics, September 1956

Age (years) and other characteristics	Both sexes		Male		Female	
	Insured 1 (5,138)	Not insured 1 (8,939)	Insured 1 (2,548)	Not insured 1 (3,956)	Insured 1 (2,550)	Not insured 1 (4,983)
Total, 65 and over.....	100.0	100.0	100.0	100.0	100.0	100.0
65-69.....	49.5	31.4	50.1	32.5	49.0	30.5
70-74.....	29.2	29.4	29.7	29.3	28.6	29.4
75 and over.....	21.3	39.2	20.1	38.2	22.4	40.1
White.....	96.7	91.0	96.7	90.4	96.8	91.5
65-69.....	47.9	28.3	48.8	28.9	47.1	27.8
70-74.....	28.2	26.4	28.6	26.0	27.8	26.7
75 and over.....	20.6	36.3	19.3	35.5	21.9	37.0
Nonwhite.....	3.3	9.0	3.3	9.6	3.2	8.5
65-69.....	1.6	3.1	1.3	3.6	1.9	2.7
70-74.....	1.0	3.0	1.1	3.3	.8	2.7
75 and over.....	.7	2.9	.9	2.7	.5	3.1
In the labor force.....	34.2	19.5	53.0	33.1	15.7	8.7
65-69.....	21.9	9.4	33.2	15.3	10.8	4.8
70-74.....	8.8	6.0	14.1	10.2	3.7	2.7
75 and over.....	3.5	4.1	5.7	7.6	1.2	1.3
Not in the labor force.....	65.8	80.5	47.0	66.9	84.3	91.2
65-69.....	27.6	22.0	16.8	17.2	38.2	25.7
70-74.....	20.4	23.3	15.7	19.0	25.0	26.7
75 and over.....	17.8	35.2	14.5	30.7	21.1	38.8
Married.....	60.4	46.0	78.5	63.7	42.7	32.0
65-69.....	34.2	17.5	42.1	22.7	26.4	13.4
70-74.....	17.9	14.6	24.3	19.3	11.7	10.8
75 and over.....	8.3	14.0	12.1	21.7	4.6	7.8
Not married.....	39.6	54.0	21.5	36.3	57.3	68.0
65-69.....	15.3	13.9	7.8	9.9	22.7	17.1
70-74.....	11.2	14.8	5.5	9.9	16.9	18.6
75 and over.....	13.0	25.3	8.2	16.5	17.7	32.2

1 Number of persons, in thousands.

SOURCE: Same as for table 3.

Table 7. Percentage distribution of the insured and the uninsured populations aged 14 and over by selected characteristics, September 1956

Population group	Both sexes		Male		Female	
	Insured	Not insured	Insured	Not insured	Insured	Not insured
Total, 14 years and over.....	100.0	100.0	100.0	100.0	100.0	100.0
White.....	94.2	82.5	94.3	82.8	94.1	82.4
Nonwhite.....	5.8	17.5	5.7	17.2	5.9	17.6
In the labor force.....	63.1	51.2	87.7	73.3	40.3	31.8
Not in the labor force.....	36.9	48.8	12.3	26.7	59.7	68.2
Married.....	74.4	59.3	77.2	61.5	71.8	57.4
Not married.....	25.6	40.7	22.8	38.5	28.2	42.6
14-64 years.....	93.0	79.0	92.8	80.1	93.2	77.9
In the labor force.....	60.7	47.1	83.9	66.7	39.2	29.8
Not in the labor force.....	32.3	31.9	8.9	13.4	54.0	48.1
Married.....	70.2	49.6	71.6	48.8	68.9	50.3
Not married.....	22.8	29.4	21.2	31.3	24.3	27.6
65 years and over.....	7.0	21.0	7.2	19.9	6.8	22.1
In the labor force.....	2.4	4.1	3.8	6.6	1.1	2.0
Not in the labor force.....	4.6	16.9	3.4	13.3	5.7	20.1
Married.....	4.2	9.6	5.7	12.7	2.9	7.1
Not married.....	2.8	11.4	1.6	7.2	3.9	15.0

SOURCE: Same as for table 3.

come but the uninsured were concentrated at the lower levels of income, whether measured as family income or as individual income.

Annual income	Percent distribution of aged	
	Insured	Not insured
<i>Family</i>		
Under \$1,000	7.1	21.1
\$1,000-\$1,999	16.2	21.4
\$2,000-\$2,999	18.4	15.2
\$3,000-\$3,999	15.1	11.1
\$4,000-\$4,999	11.9	8.7
\$5,000 and over	26.3	18.1
(Not available)	(5.0)	(4.4)
Total	100.0	100.0
<i>Individual</i>		
Under \$1,000	33.4	61.3
\$1,000-\$1,999	27.5	19.9
\$2,000-\$2,999	15.6	7.9
\$3,000 and over	18.7	6.8
(Not available)	(4.8)	(4.1)
Total	100.0	100.0

The size of the sample of aged persons precluded further cross classification. It would have been informative, for example, to cross classify insurance and annual income level with labor force participation, with age, and with marital status.

Table 6 enables one to see simultaneously several of the characteristics of insured and uninsured persons in the population aged 65 and over. Half of the insured aged are in the age bracket 65-69. (Twenty-five percent of the aged are both 75 and over in age and have no insurance. Twenty-four percent of the aged population consists of nonmarried uninsured women; nearly half of this group has passed the 75th birthday.)

A third of the insured aged population was still in the labor force, although among aged persons as a group, only one in four was in the labor force.

The population "14 and over" is usually selected by the Bureau of the Census for studies of labor force participation, marital status, and

the like, subdivisions of significance also in relation to health insurance ownership. In the population as a whole in the September 1956 survey, about 30 percent were under age 14 and, like the adults or the population of all ages, two-thirds of the children were insured. Table 7 shows how the insured portion, two-thirds of the whole, differed from the uninsured portion of the population aged 14 and over. The relative numbers who were married, the degree of participation in the labor force, and the proportions who were aged 65 and over were quite different in the insured and uninsured segments of the population. The group not reached to date by insurance presents special problems of enrollment.

Recent Growth in Coverage

Data collected in interviews in sample households generally have yielded lower rates of insurance protection for the public than those for recent years published by the Health Insurance Council, whose member companies account for more than 90 percent of the health insurance issued by the insurance business (7).

Measurement of Growth

Sampling errors are possible in studies based on interviews, and underenumeration may

have occurred for several reasons. The sample households do not include the institutional population, some of whom have health insurance. The person being interviewed may not be cognizant of the family protection available through the employment of the head of the household. However, in the September 1956 survey the families being interviewed were asked in advance to check on their health insurance so that they could be responsive to the interviewer's questions. Finally, persons protected by more than one policy are of course counted only once as insured, regardless of the number of policies they may have covering the same type of medical expense. It is also possible that some overstatement results from interviewing persons who are unfamiliar with the provisions of their policies and who may confuse accident-only policies, travel-accident policies, and automobile policies which include medical benefits with the kinds of health and medical care insurance the surveys attempt to measure.

There is also some justification for the belief that national aggregates may contain some overstatement. National aggregates, obtained company by company from health insurance underwriters, require correction for duplicate coverage; this correction is made on the basis of periodic sampling. As more and more em-

Table 8. Health insurance coverage by type of insurance: Number of persons enrolled and rate per 1,000 population, 1948-57

End of year	Hospital expense		Surgical expense		Regular medical expense	
	Number (thousands)	Rate per 1,000	Number (thousands)	Rate per 1,000	Number (thousands)	Rate per 1,000
1948-----	60,995	420	34,060	235	12,895	89
1949-----	66,044	448	41,143	279	16,862	114
1950-----	76,961	512	54,477	363	21,589	144
1951-----	85,991	569	65,535	434	27,723	181
1952-----	91,667	598	73,161	477	35,797	233
1953-----	97,303	624	80,982	519	42,684	274
1954-----	101,493	638	85,890	540	47,248	297
1955-----	107,662	663	91,927	566	55,506	342
1956-----	115,949	701	101,325	613	64,891	392
1957-----	121,432	721	108,931	647	71,813	426

SOURCES: For number enrolled, Health Insurance Council: *The Extent of Voluntary Health Insurance Coverage in the United States as of December 31, 1957*, p. 11.
For rates per 1,000, Agnes W. Browner: *Voluntary Health Insurance—Estimated Enrollment and Rates per 1,000 Population, 1937-1957*. Social Security Administration, Division of Program Research, Research and Statistics Note No. 26, July 24, 1958, pp. 3-5.

ployers include health insurance as a fringe benefit, the likelihood of husbands and wives each having family coverage when both are working is increased. A second area of uncertainty arises in connection with dependent coverage, since many carriers do not know how many children are included in family policies. A third area of uncertainty results from fluctuations in employment in a given occupation, which may change the number of persons entitled to benefits at a given moment.

Finally, the tendency to report coverage in round numbers may also exaggerate the actual count. In its studies of self-insured union plans, the Division of Program Research, Social Security Administration, has noted that the reports received frequently state coverage in such round terms as "5,000 members and 14,000 dependents," whereas an actual count might yield a considerably lower figure (8).

Comparative Data on Coverage

In 1953 the household survey made by the National Opinion Research Center showed 570 persons with hospital insurance per 1,000 population. The Health Insurance Council data yielded a mid-1953 figure of 611 persons per 1,000, 41 more persons per 1,000. For 1956 the Current Population Survey of the Bureau of the Census indicated 636 persons per 1,000 as having hospital insurance; the council's figure was 682, or 46 more persons per 1,000. However, growth between the two sample survey periods was 66 per 1,000 and growth recorded by the Health Insurance Council in the same span of years was 71 per 1,000. These are closely corresponding figures.

Table 8 presents data for the years 1948-57 from the Health Insurance Council for the number of persons estimated to have hospital, surgical, and medical expense insurance as of December 31 in each of the 10 years. Three hundred more persons per 1,000 had hospitalization insurance at the end of 1957 than at the end of 1948, in a period when population rose 23.2 million. Surgical protection rose even more rapidly. The number with any form of medical expense insurance increased from less than 1 in 10 to more than 4 in 10.

These national aggregates do not afford any measure of the characteristics of the popula-

Table 9. Persons with health insurance per 1,000 population, by age and sex, July 1953 and September 1956

Sex and age group (years)	Insured persons per 1,000		Increase in number of insured persons per 1,000 from July 1953 to September 1956
	National Opinion Research Center Survey, July 1953	Current Popula- tion Survey, Septem- ber 1956	
Total population..	570	636	66
Male.....	570	640	70
Female.....	570	632	62
Under 65.....	594	661	67
Male.....	587	662	75
Female.....	613	660	47
Children ¹	576	641	65
Male.....	569	640	71
Female.....	590	642	52
Adults under 65 ²	605	671	66
Male.....	599	674	75
Female.....	626	669	43
65 and over.....	311	365	54
Male.....	356	392	36
Female.....	267	342	75

¹ Under age 18 in the National Opinion Research Center Survey; under age 14 in the Current Population Survey.

² Aged 18-64 in the National Opinion Research Center Survey; aged 14-64 in the Current Population Survey.

SOURCES: For 1956 data, same as for table 3; for 1953 data, reference 6.

tion that is being increasingly included under various health insurance plans. Such information can only be obtained from household interview survey data of the kind given in tables 6 and 7. Tables 9 and 10 show the extent of growth in enrollment recorded by age and sex between the September 1956 survey and two earlier surveys.

Between July 1953 and September 1956, the number of insured persons per 1,000 in the population showed an increase of 66 (table 9). Averaged over the 3-plus years, this is an increase of about 22 persons per 1,000 per year. (In this period the population increased by 10 million, an increase that decidedly offset the gross expansion in the number of persons with insurance. The population aged 65 and over increased by about a million in the same period.) The largest relative increase in any age group was registered among women aged 65

Table 10. Number of insured persons aged 65 and over in the Current Population Surveys for March 1952 and September 1956

Sex and age group (years)	Number insured per 1,000		Increase in number of insured per- sons per 1,000 from March 1952 to September 1956
	March 1952	Sep- tember 1956	
65 and over.....	263	365	102
Male.....	302	392	90
Female.....	228	342	114
65-69.....	364	476	112
Male.....	423	498	75
Female.....	309	455	146
70-74.....	248	363	115
Male.....	282	395	113
Female.....	217	336	119
75 and over.....	150	237	87
Male.....	158	253	95
Female.....	144	225	81

SOURCES: For 1956 data, same as for table 3; for 1952 data, reference 5.

and over in which 75 additional persons per 1,000 raised the proportion insured from 267 per 1,000 to 342. The smallest increase was among men in this same age bracket, 36 per 1,000. In the other age groupings, the number of insured men per 1,000 added in the interim was larger than the number of additional insured women per 1,000.

With the spread of family coverage in the last few years, it would be expected that females under age 65, who were found to have a larger number insured per 1,000 than males in the earlier surveys, would have maintained or added to their lead. By the September 1956 survey, however, younger women were found to lag behind men in the proportions insured. The differential between men and women was reduced, however, between the two survey dates for those aged 65 and over.

The National Opinion Research Center sample was relatively small at the higher ages, reducing the possible significance of the 3-year comparison for this age bracket. However, rates for the aged found in the March 1952 Current Population Survey, when compared with those of the September 1956 survey, con-

firm the improvement in coverage of aged women in recent years (table 10). Identical survey techniques were used in the two surveys.

The largest gains in insured persons, 146 per 1,000, have been achieved among women aged 65-69. This finding provides strong evidence that many persons who were in the age bracket 60-64 in 1952 and now would be in the age bracket 65-69 have maintained the insurance coverage they had before they reached their 65th birthday. As further evidence that older people are continuing their insurance, the proportions with insurance that were found for those aged 65-69 in March 1952 are comparable to those for the age bracket 70-74 in 1956.

Since no survey prior to the September 1956 study examined the marital status of the insured population, no conclusions can be drawn from tables 9 and 10 as to relative improvement in coverage in this respect.

HOSPITAL UTILIZATION

Before examining the relation of hospital utilization to marital status, a review of the reasons why people of different ages are admitted to hospitals would be helpful.

Why People Enter Hospitals

In their analyses of data from the 1956 survey, Odoroff and Abbe (9) showed that for the population of all ages (both sexes combined) approximately a fourth of all admissions were for surgery, more than a fifth were for obstetrics, nearly a third were for other causes, and only 6 out of 100 admissions were for accidents. In their analysis, pediatric admissions were separated from the other categories and accounted for 16 percent of all admissions. Their report shows the average stay for surgical procedures as 10.6 days, with accidents averaging 12.1 days, obstetrics, 4.5 days, pediatrics, 5.2 days, and other reasons, 9.3 days.

The annual rates of persons hospitalized are lower than annual admission rates since some of the persons hospitalized have more than one period as a patient. In the total survey population there were 1,174 admissions for each 1,000 persons hospitalized. In the population 14 and

over, insured hospitalized persons had fewer admissions than uninsured hospitalized persons, and admissions among males, particularly uninsured males, exceeded those among females per hospitalized person. Multiple admissions increased with age.

However, for present purposes, admission rates rather than rates of persons hospitalized are more meaningful, since the reason for being admitted has significance only in relation to each separate hospital stay.

The data on hospital utilization, admissions and length of stay based on household interviews, did not include persons who did not survive the year prior to the survey date. As a result, the rates underestimate the actual use of hospitals by a given population, probably by about 25 percent for the aged and somewhat less for all ages.

Table 11 divides hospital admission rates per 1,000 among four broad categories given by respondents in the household interviews as reasons for having been in the hospital. Four significant facts are discernible from the rates as tabulated: (a) insured persons are admitted with greater frequency than uninsured persons for operations and for all conditions other than

accidents, and this holds regardless of age or sex; (b) the admission rate for accidents and injuries is identical for each of the two age groups of males aged 14 and over and 14-64, with almost no differences in the rates for insured and uninsured; (c) the admission rate for accidents and injuries among females in the age bracket 14-64 is less than half that of males of the same ages, while the admission rate for accidents among insured females 65 and over is twice that for uninsured aged females or for insured aged males; and (d) in the age group 14-64, more insured than uninsured women per 1,000 were admitted for childbirth. (Although one in two admissions was for childbirth among uninsured women, only about one in three admissions among insured women was for this reason.)

Under age 14 and after age 64 males have more admissions for operations per 1,000 than females. In fact the rate of admissions for operations among elderly males with insurance, 58 per 1,000, is nearly double that of younger insured males. In contrast, among the older men the proportion of admissions for accidents or for other reasons was about the same whether or not there was insurance. This similarity in reasons for admission was not found among

Table 11. Annual admission rates per 1,000 persons by reason for admission to general hospitals, by age, insured status, and sex, noninstitutional population, year ending September 1956

Sex and reason for hospital admission	Total	Under 14 years ¹	14 years and over			14-64 years			65 years and over		
			Total	Insured	Uninsured	Total	Insured	Uninsured	Total	Insured	Uninsured
Both sexes.....	101	54	120	134	93	119	133	89	125	154	108
Operations.....	32	24	35	41	24	35	40	23	37	50	30
Accidents and injuries.....	8	6	9	9	9	8	8	8	14	16	13
Childbirth.....	22	-----	30	33	25	34	35	32	-----	-----	-----
Other.....	39	25	46	51	35	42	49	27	72	86	64
Male.....	76	61	83	91	68	75	85	53	139	155	129
Operations.....	28	26	29	34	21	27	32	17	45	58	36
Accidents and injuries.....	11	7	12	12	13	12	12	13	12	10	13
Other.....	37	27	41	45	34	36	42	23	82	86	80
Female.....	124	48	152	176	115	158	177	121	110	151	89
Operations.....	35	21	40	48	27	41	48	28	31	43	25
Accidents and injuries.....	6	5	6	6	6	5	5	4	16	22	13
Childbirth.....	41	-----	57	63	48	65	68	60	-----	-----	-----
Other.....	41	22	49	57	35	47	55	30	63	86	51

¹ Data according to insured status were not collected for persons under age 14.

NOTE: Due to rounding, not all subtotals add to the totals.

SOURCE: Same as for table 3.

Table 12. Hospital utilization rates by insured status, marital status, and sex of persons 14 years of age and over, year ending September 1956

Sex and age group (years)	Total		Insured		Not insured	
	Married	Not married	Married	Not married	Married	Not married
Annual admissions per 1,000 population						
Male, 14 and over.....	89	67	97	72	74	62
14-64.....	84	54	92	64	62	41
65 and over.....	132	158	149	176	119	151
65-69.....	131	137	144	131	114	140
70-74.....	130	139	146	99	118	153
75 and over.....	137	185	173	273	124	157
Female, 14 and over.....	190	80	211	88	146	72
14-64.....	196	71	214	75	154	61
65 and over.....	110	112	134	166	93	88
65-69.....	102	93	109	149	94	54
70-74.....	107	108	166	155	72	86
75 and over.....	139	127	202	196	119	107
Average days of stay per admission						
Male, 14 and over.....	10.8	14.6	9.6	9.6	14.1	20.6
14-64.....	10.4	11.4	9.5	8.4	14.1	17.3
65 and over.....	12.5	22.1	10.7	15.7	14.2	24.9
65-69.....	12.7	36.0	10.3	19.5	16.2	43.9
70-74.....	9.4	17.3	10.9	29.8	7.8	14.4
75 and over.....	15.7	17.1	11.5	10.4	17.7	20.8
Female, 14 and over.....	6.3	10.8	6.3	10.2	6.5	11.6
14-64.....	6.1	9.9	6.1	9.3	6.1	11.0
65 and over.....	11.3	12.5	11.4	12.7	11.3	12.4
65-69.....	11.4	12.6	11.3	13.9	11.6	10.2
70-74.....	10.7	11.5	12.3	13.3	8.9	9.8
75 and over.....	11.7	13.2	9.5	11.3	12.9	14.2
Annual days per 1,000 population						
Male, 14 and over.....	964	979	927	691	1,047	1,279
14-64.....	875	616	874	540	878	708
65 and over.....	1,651	3,486	1,598	2,768	1,694	3,757
65-69.....	1,658	4,937	1,490	2,553	1,860	6,147
70-74.....	1,223	2,405	1,594	2,950	923	2,210
75 and over.....	2,147	3,159	1,983	2,852	2,207	3,258
Female, 14 and over.....	1,201	868	1,319	897	954	838
14-64.....	1,198	701	1,310	701	940	701
65 and over.....	1,245	1,402	1,528	2,111	1,049	1,090
65-69.....	1,161	1,170	1,227	2,066	1,092	551
70-74.....	1,149	1,237	2,048	2,067	640	846
75 and over.....	1,624	1,673	1,924	2,210	1,532	1,519

¹ 65 admissions for childbirth. ² 68 admissions for childbirth. ³ 60 admissions for childbirth. ⁴ 293 days for childbirth with an average length of stay of 4.5 days. ⁵ 306 days for childbirth, assuming an average length of stay of 4.5 days. ⁶ 270 days for childbirth, assuming an average length of stay of 4.5 days.

SOURCE: Same as for table 3.

older women; the insured older women had a greater volume of admissions for each cause of admission than the uninsured.

Relation of Marital Status to Use

Table 12 shows by sex the annual admissions, days of stay per admission, and days per 1,000 used by married or nonmarried (single, divorced, or widowed) persons. The insured and uninsured are contrasted by marital status.

Annual Admission Rates

In the analysis of admissions per 1,000, some interesting if not altogether unexpected relationships emerge. Among males aged 14 and over, or aged 14-64, the married men have a higher admission rate than the nonmarried men. The average age of the married men may be higher than that of the nonmarried group of males, and therefore differences in health that come with age may account for at least part of the difference in admission rates. This seems to be the case among insured males in this age bracket, for the average hospital stay of those who were married was 1.1 days longer than among those who were not married. This does not serve to explain the very low admission rate coupled with a relatively long stay found among uninsured nonmarried males. Seemingly this group entered the hospital only when so seriously ill that a prolonged stay was often necessary. Also it may reflect the absence of a wife concerned with the health of her spouse and alert to a condition that needed immediate hospital care.

Mortality data by marital status in the continental United States for 1957, collected by the National Office of Vital Statistics, Public Health Service, are available for the first time since 1953 (table 13). A comparison of the 2 years shows that death rates by marital status have remained about the same, and that "in each age group, for both sexes, the death rate for unmarried persons is higher than for married persons. . . . For both the married and the unmarried, the age-specific death rates for males are higher than the corresponding rates for females" (10a).

It would appear that with or without health insurance or hospital utilization, marital status

is related to health, as the Abel-Smith and Titmuss study concluded (1), and that single non-married males have a less favorable health outlook.

In the male group 65 and over, in which the average age of married and nonmarried men is undoubtedly more similar, single men have higher hospital admission rates, and the difference between the married and nonmarried group increases with advancing age (table 12). The absence of a spouse probably made use of the hospital unavoidable in some instances. These differences are found whether or not the patient has insurance, although two exceptions occur: the insured married men aged 65-69 and 70-74 in the sample have a higher admission rate than the corresponding nonmarried men but do not remain so long in the hospital. For the 70-74 group in particular, the figures may well be due to sampling error.

Like the men, married women aged 14 and over use hospitals more often than single women, even when childbirth is excluded. Married insured women aged 14-64 used hospitals at a very high rate since more than one

Table 13. Estimated death rates per 1,000 by marital status, age, and sex: United States, 1953 and 1957¹

Sex and age group (years)	Married		Unmarried (single, widowed, and divorced)	
	1957 ²	1953 ²	1957 ²	1953 ²
Male, 20 and over:				
20-24.....	1.5	1.4	2.3	2.5
25-34.....	1.5	1.6	3.4	4.0
35-44.....	3.1	3.3	8.3	8.1
45-54.....	8.2	8.9	19.1	18.2
55-64.....	20.3	21.4	37.6	31.9
65-74.....	45.2	42.0	68.7	65.8
75 and over.....	101.2	91.9	136.0	146.9
Female, 20 and over:				
20-24.....	0.7	0.7	1.0	1.3
25-34.....	1.0	1.1	2.3	2.3
35-44.....	2.1	2.3	4.1	4.1
45-54.....	4.7	5.3	7.8	8.3
55-64.....	11.0	11.8	15.4	15.2
65-74.....	28.2	26.5	34.8	35.6
75 and over.....	67.3	68.4	106.0	105.1

¹ Deaths in continental United States only.

² Rates based on population estimated as of July 1 for each year.

Source: Reference 10b.

in five was admitted in the course of the 12 months. Even though 68 of the 214 admissions per 1,000 recorded for these women were for childbirth, there still remained 146 admissions per 1,000 for other causes, nearly double the rate of 75 for the unmarried insured women.

All the admission rates of aged uninsured women are much lower than the rates of the corresponding groups of aged uninsured men.

Like the men, at the older ages insured women who are not married enter hospitals with greater frequency than insured married women. Single insured women make more use of hospitals than any other group. In addition, unlike the older men, uninsured older women who are not married are somewhat less likely to be admitted to hospitals than uninsured married women. Since aged widows are found in great numbers in this age group, there appears to be a relationship between low income, no insurance protection, and lack of hospital care.

The presence or absence of insurance appears to have a differential effect on hospital admissions depending on sex and age. Among males aged 14-64, the fact that they are married increases admission to hospitals to about the same extent as the fact that they have insurance protection. Among the women in this age bracket, even after excluding admissions for childbirth, the fact that they are married appears to increase admissions decidedly. The presence of insurance further increases the non-obstetrical admissions of married women, while the presence or absence of insurance has little effect on the proportion of nonmarried women admitted to hospitals. Being married increases admissions from 50 percent (among the uninsured) to 100 percent (among the insured) over their nonmarried counterparts. Married insured women enter hospitals 2.3 times as often as single uninsured women.

After age 65, insurance ownership increases admissions somewhat among married men but has little effect on unmarried men. Among elderly women, the presence of insurance is more important than the presence or absence of a spouse in increasing hospital admissions.

When hospital admissions are broken down into smaller age groups for the total group, the admission rates for both sexes combined are

highest in the childbearing years 25-34 (table 14).

Length of Stay

Admission rates to hospitals reveal only part of the picture, however. With only three exceptions (insured men in the age groups 14-64 and 75 and over and uninsured women in the age group 65-69) the unmarried patients average longer stays in the hospital than the married patients (table 12). Among the male group the uninsured married men in general remain longer on the average than the insured married men; the same is true when the insured and uninsured who are not married are compared. In the latter case, the average stay is considerably longer for the patient group containing the uninsured who are not married. The differences in average length of stay between married or not married and insured or not insured is not nearly so decided nor so consistent among the women.

Length of stay per admission rose consistently with increasing age, except for minor deviations after age 69 where the sample size probably caused some variation. Nevertheless, the average stay for the total hospitalized population did not exceed 20 days in any age group (table 14).

If males and females are compared by age-sex-marital status groupings (table 12), the average for males in some categories after age 65 was higher than 20 days (in the unmarried and, in some cases, the uninsured categories). Stays of all durations from a day or two to practically a full year were included in the survey data.

Annual Rates in Days

Volume of hospital care in annual days used per 1,000 was higher for insured than uninsured in almost every age group (table 14). The insured population as a whole used 83 more days per 1,000 than the uninsured.

The third part of table 12 provides contrasts between married and nonmarried persons in the annual days of hospital care used. Relatively low use of hospital days was recorded for all the categories for the unmarried at the younger ages, and among aged uninsured women, whether or not they were married.

Table 14. Hospital utilization rates by insured status and age group, year ending September 1956

Age group (years)	Annual admissions per 1,000 population			Average days of stay per admission			Annual days per 1,000 population		
	Total	Insured	Uninsured	Total	Insured	Uninsured	Total	Insured	Uninsured
All ages-----	101	113	73	8.0	7.4	10.3	808	836	753
Under 14-----	54	69	28	5.2	4.7	7.1	279	323	200
14-24-----	119	123	109	5.5	5.2	6.3	649	640	687
25-34-----	162	171	132	6.1	5.9	7.0	991	1,009	924
35-44-----	109	118	80	8.4	8.2	9.3	912	968	744
45-54-----	93	104	64	9.9	9.0	13.9	926	936	890
55-64-----	104	116	74	12.8	11.8	16.8	1,331	1,369	1,243
65 and over-----	125	154	108	14.0	12.1	15.6	1,746	1,856	1,683
65-69-----	114	135	95	15.5	12.1	19.8	1,764	1,636	1,881
70-74-----	119	148	103	11.5	13.2	10.0	1,361	1,950	1,029
75 and over-----	142	205	122	14.5	10.9	16.5	2,066	2,241	2,012

SOURCE: Same as for table 3.

In sharp contrast either with unmarried women or with married men is the volume of hospital care recorded per 1,000 older unmarried men, whether insured or not. Their rate exceeds even the rate of women in the childbearing years. In fact, more than 6 days annually per capita were used by unmarried uninsured men aged 65-69. In this same age bracket, uninsured married men accounted for less than 2 days per capita, and uninsured unmarried women used only about one-half day per capita in the survey year.

SUMMARY

As of September 1956, the civilian noninstitutional population residing in the continental United States had the following characteristics with respect to marital status, health insurance, and hospital utilization:

About two-thirds of the total population had some form of health insurance protection, one-third had none.

Nearly two-thirds of those under 65 had health insurance in some form; only 36 percent of those over 65 were insured.

Among the aged, the proportion with insurance declined with advancing age, so that fewer than one-fourth were insured among those 75 and over.

Of the insured aged, that is 65 years and over, 1 in 4 had only hospitalization insurance,

whereas among those under 65, only 1 in 8 had benefits limited to hospitalization.

Of the insured population, 95 percent were under 65; 30 percent were under 14. Ninety-four percent were white; 6 percent nonwhite. Of those 14 and over, 63 percent were in the labor force; 88 percent of the insured men and 40 percent of the insured women were working or looking for work. Since approximately equal numbers of married men and married women were insured in the 14-64 age group, it is obvious that many of the women obtained their insurance by virtue of their husband's employment.

Of the uninsured population, 15 percent were aged over 65, 85 percent under 65, and 29 percent under 14. Nineteen percent were nonwhite. Of those over 14, only 51 percent were in the labor force, 73 percent of the men and 32 percent of the women. Four in 10 were not married, and 1 in 10 was both over 65 and not married. Twenty-two percent of the women were 65 and over, most of them neither in the labor force nor married.

The uninsured include large proportions who are not gainfully employed as well as many of the aged who have only small retirement incomes or no incomes. The uninsured, therefore, appear to be difficult to enroll under any of the usual methods of group enrollment used by insurance companies and plans.

The aged insured were heavily concentrated

in the age bracket 65-69. Although only 38 percent of the aged population fell in this age group, half of the insured aged population was found in it, and less than a third of the uninsured aged population.

The aged insured population was almost entirely white; only 3 percent were nonwhite. Nine percent of the uninsured aged population was nonwhite.

The findings from the September 1956 survey and the comparison with the March 1952 survey point to the conclusion that persons entering the retirement years continue the health insurance they obtained when they were younger if it is possible to do so. A fairly high level of insurance protection exists among persons in the labor force and among married persons. Lacking such protection are those with low incomes and those who are neither in the labor force nor married to a person who is or has recently been in the labor force.

Among the insured, hospital admissions were more frequent than for the uninsured but the stay was shorter. Average stay for the insured was 7.4 days; for the uninsured, 10.3 days. Average stay for both groups combined was 8 days. Insured persons used 83 more days of hospital care per 1,000 than uninsured persons in the course of a year.

Admission rates were highest at age 25-34 for the total group; admissions for maternity during the childbearing years affected the rate for both sexes combined.

Length of stay per admission rose with increasing age. The average stay per admission never exceeded 20 days in any age group.

The volume of hospital care, that is, the annual rate per 1,000, was higher for older unmarried men, whether insured or not, than for married men or unmarried women. It exceeded even the rate of women in childbearing years.

Between the ages of 14 and 64 marriage appeared to be a factor associated with greater use of days of hospital care, whereas insurance ownership had no appreciable effect, except among married women. After age 64, the greatest impact on days of hospital care among

the men appeared to be related to their wifelessness and not to their having or not having insurance. Among aged women both marital status and insurance had an impact; single insured women were the largest users of days of hospital care; single uninsured women were also generally the smallest users, particularly in the 65-69 age group.

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Observations on Asian Influenza on Two Alaskan Islands

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IN OCTOBER 1957, the variant of type A influenza virus commonly referred to as Asian virus was widely prevalent in larger urban centers and many native villages of Alaska. A second wave of influenza was noted early in 1958 in a few villages in southern Alaska which had previously escaped the disease. The overall influenza morbidity in the State is not precisely known but undoubtedly was high. The general mildness of the disease was reflected in influenza and pneumonia mortality rates. They were only slightly higher during October than normally expected for that month, according to the Alaska Department of Health.

Influenza likewise occurred in several remote island communities of Alaska, two of which were St. Paul, Pribilof Islands, and Gambell, St. Lawrence Island, where opportunity was afforded for rather complete investigation. Results of the investigation reported here are of interest because the communities were more isolated than those populations from which most information on Asian influenza has been derived. This isolation facilitated tracing the

mode of introduction of disease into each village. Attack rates were extremely high, and the frequency of pulmonary complications in St. Paul was higher than observed generally.

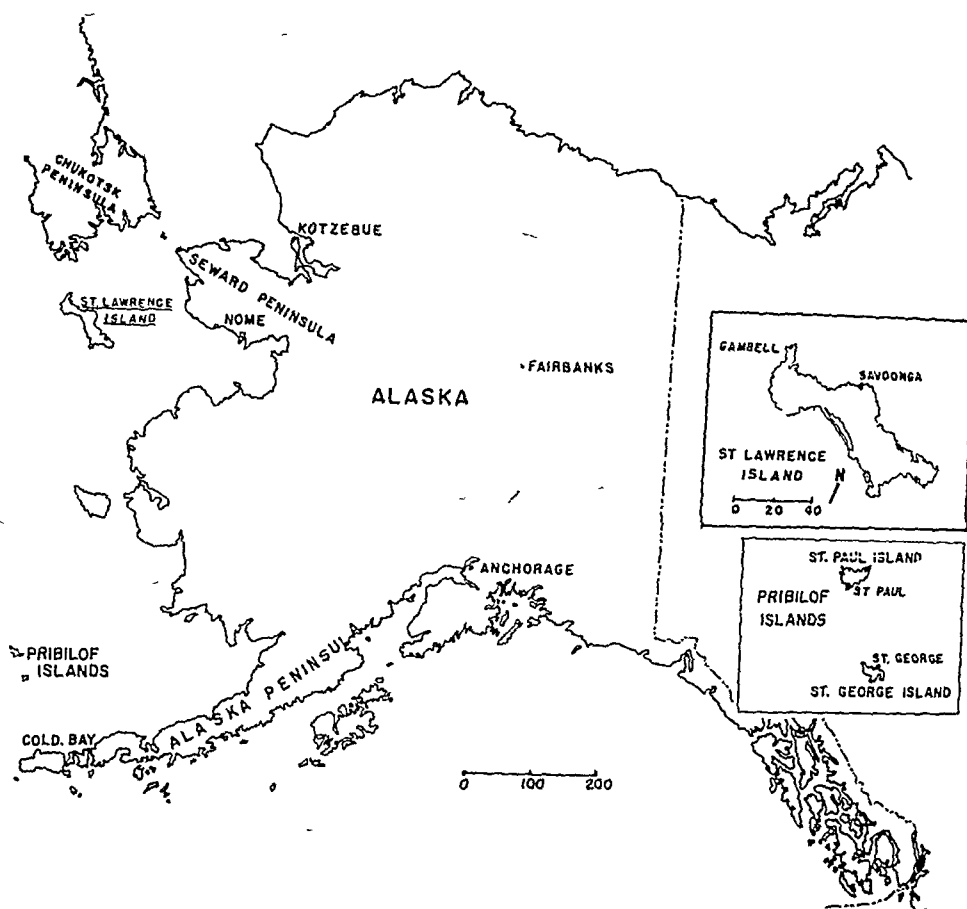
Background

St. Paul Island is in the Bering Sea approximately 250 miles northwest of the Aleutian chain (fig. 1). The chief mode of travel to St. Paul is by weekly commercial air service from Cold Bay on the Alaska Peninsula. Travel by boat is limited to infrequent visits by U.S. Fish and Wildlife Service and Coast Guard vessels. The neighboring island community of St. George is only 50 miles from St. Paul, but there was no traffic between them during the outbreak in St. Paul. Consequently, influenza did not occur in St. George.

St. Paul village is comprised of some 350 residents most of whom are predominantly of Aleut descent. The chief industry is fur sealing under U.S. Fish and Wildlife Service jurisdiction, and the majority of the few non-native residents are employees of this agency. The village is compact. The dwellings are generally multiroom and clean, have most of the modern conveniences, and reflect the prosperity of the community. Village ties within racial groups are close, and there is much social interchange among households (defined as one or more persons living as a family group under a single roof). Community life centers around the school, church, movie theater, store, and commissary. The residents are well nourished and warmly clothed. Their health needs

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Figure 1. The State of Alaska, with St. Lawrence, St. Paul, and St. George Islands.



are served by a Public Health Service physician in a small clinic-hospital.

St. Lawrence Island is in the northern part of the Bering Sea approximately 120 miles from Alaska and 40 miles from Siberia (fig. 1). It is inhabited by some 550 Eskimos residing in two communities of similar size, Gambell and Savoonga. At the time of the outbreak, all transportation to the island was by biweekly commercial air service from Nome, Alaska, to Gambell, and all persons traveling to Savoonga pass through Gambell. The Eskimo residents are gregarious, and their villages are usually composed of single-room frame houses which are crowded and poorly constructed in comparison with housing in St. Paul. Community life centers around the school, mission, native store, and National Guard armory. Health services for the island are administered directly by an Alaska Department of Health nurse who

resides in Gambell. Illnesses requiring hospitalization are referred to the Public Health Service's Alaska Native Hospital, Kotzebue.

Influenza occurred in Savoonga also shortly after it was introduced into Gambell. However, details of the outbreak in Savoonga were not sufficiently complete to merit inclusion in this report.

Methods

Clinical observations were based on 192 patients (65 percent of the total 294 cases) who were seen at the clinic during the outbreak in St. Paul. Detailed clinical observations were not obtained in Gambell. Epidemiological observations were obtained in St. Paul by a survey of all households immediately after the epidemic, and in Gambell, primarily from health department nursing records and a can-

vass of all households 1 and 3 months after the outbreak. The majority of illnesses were attended by the nurse who recorded dates and major symptoms. Dates of occurrence of unattended illnesses were obtained in retrospect by relating them to onsets of attended illnesses among household associates.

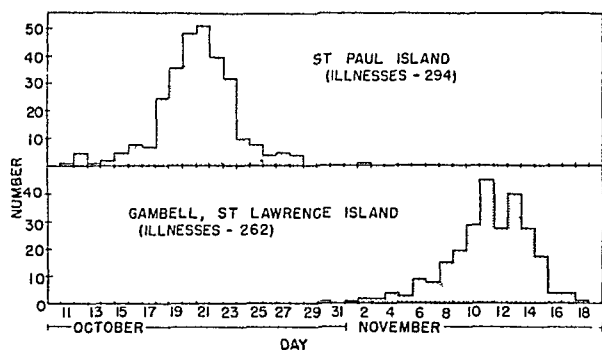
Serologic observations in St. Paul were based on blood serums obtained from 152 persons by Dr. C. M. Eklund, Rocky Mountain Laboratory, Hamilton, Mont., during his investigation of an outbreak of poliomyelitis in 1954 (1), and serums obtained by Weeks from 30 persons 1 to 2 months after the outbreak. Although postepidemic serums in St. Paul were obtained from few persons, most of whom were adults, and donors were not selected on the basis of occurrence of illness during the outbreak, it is felt that the test results are probably representative of adult age groups.

Gambell observations were based on serums obtained from 85 persons during investigation of a mumps epidemic 3 months prior to the influenza outbreak (2) and from 125 persons 3 months after the outbreak. Persons contributing blood specimens prior to the outbreaks were selected only on the basis of availability, cooperativeness, and age. Proportionately fewer serums were obtained from children under 6 years of age than other age groups. Postepidemic serums in Gambell were obtained from all available persons, approximately 6 years or older, who were willing to contribute blood specimens.

Testing was carried out by the hemagglutination inhibition (HI) technique in the manner recommended by Jensen (3) with his suggested modifications (4). Potassium periodate was used to inactivate nonspecific inhibitors to influenza viruses in the serums. Antibody titers are recorded as the final serum dilutions giving inhibitions. Although serums obtained prior to and after the outbreak in each village were not tested simultaneously, human serums of known titers to each test antigen were included as controls in each test.

The influenza virus strains used as HI test antigens included swine (Shope), A/PR8, A/1520 (a Denver-like A' strain isolated in Hamilton, Mont., March 1956), and A/Jap/305/57 (Asian). Antigens were prepared by

Figure 2. Number of illnesses occurring daily during the St. Paul and Gambell influenza outbreaks, 1957.



allantoic inoculation of virus seed into 10-day embryonated chicken eggs. After 4 days' incubation, allantoic fluids were harvested and titrated by hemagglutination against known antisera. Eight hemagglutinating units of antigen were used in the test.

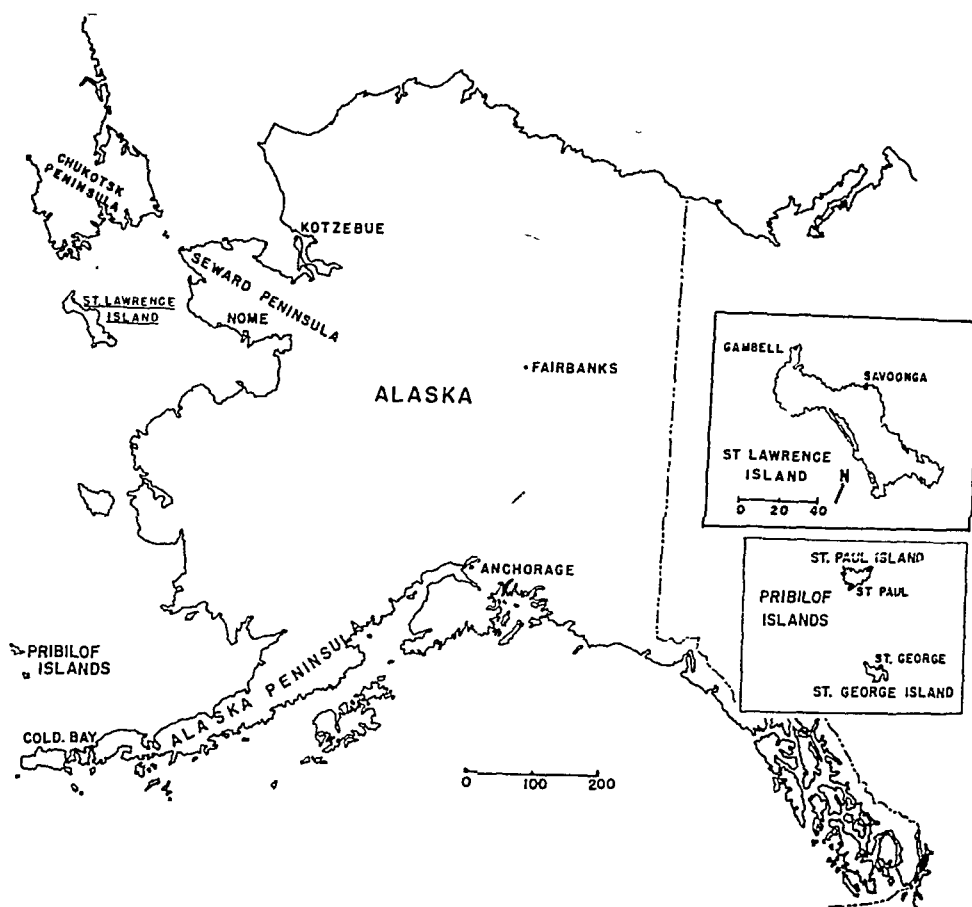
Pharyngeal swabs were obtained for culture from 38 ill persons during the latter stages of the outbreak in St. Paul. These were immediately planted in stock culture agar (Difco) slants and held at approximately 4° C. for 3 to 6 days until they could be transported to the Infectious Disease Laboratory, Arctic Health Research Center, Anchorage, for processing and bacteriological identification.

Figure 2 shows the chronological occurrence of illness during each outbreak. Two hundred and ninety-four (82 percent) of 358 St. Paul residents were ill between October 11 and November 2. Two hundred and sixty-two (87 percent) of 300 Gambell residents were ill between October 30 and November 18. Each outbreak was sharp, carried high risk of attack, and lasted approximately 3 weeks. The epidemic curves are similar and are characteristic of influenza.

Source of Outbreaks

Logs of all incoming traffic are maintained in each community. Examination of the St. Paul log and careful questioning of each passenger indicated that influenza was introduced into the village October 10 when four persons arrived by plane from Cold Bay, Alaska Peninsula. Since two of the passengers had influ-

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and sex, that is, risk of illness was only slightly greater for children than adults, and there was no difference between males and females (table 1).

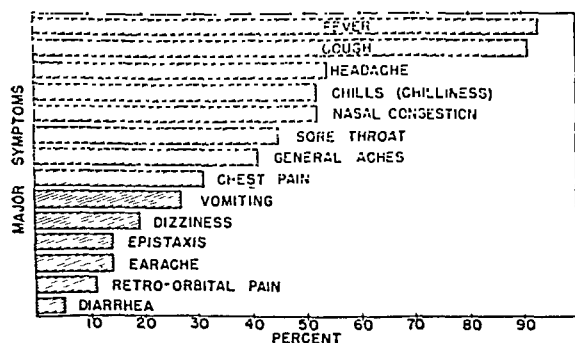
Table 2 compares the proportion of white and Aleut residents of St. Paul who were ill. Attack rates were similar among the 328 St. Paul Aleuts and 300 Gambell Eskimos (table 1) but distinctly lower among the 30 St. Paul white residents.

It is believed that the lower attack rate in white persons was at least partially due to their less frequent and intense exposure to the disease. There was little intermingling of white with other St. Paul residents except in the school and places of occupation. Nearly one-half of initial household cases occurred among school children, suggesting that the school played an important role in dissemination of the disease in the community. Of 14 white households (comprising an average of 2.1 persons), only 5 had illnesses. Two of the five had school children, whereas all nine households without illnesses consisted wholly of adults. On the other hand, all but 1 of 61 native households (comprising an average of 5.4 persons) had illnesses, and most of these households had school children.

Clinical Observations

The illnesses were generally mild and clinically characteristic of influenza in less remote populations. Figure 3 shows the frequency of various symptoms among 192 ill persons who were medically attended in St. Paul. Fever

Figure 3. Frequency of major symptoms among 194 influenza patients in St. Paul, 1957.



and cough were almost universal. The maximum recorded temperatures of febrile illnesses ranged from 99° F. to 106° F., with a mean maximum of 101.5° F. Thirty-seven percent of ill persons had productive cough, and it is noteworthy that 7 percent had hemoptysis. Painful deglutition was not observed, but many patients complained of "scratchy" throats. Nearly one-third complained of chest pain, usually substernal. Epistaxis was infrequent, but several individuals had severe nosebleeds which stubbornly resisted control. Earaches, predominately in children, complicated 14 percent of illnesses. Few of these progressed to drainage.

Of particular importance was the high frequency of lower respiratory complications (table 3). Since nearly all severely ill persons very likely sought medical care, frequencies were based on total illnesses by age and sex. One-third of illnesses had pulmonary or bronchial complications. Frequency of such complications, particularly those which were most severe, correlated directly with increasing age. Complications were equally frequent among males and females. Ten persons were hospitalized for pneumonia which was confirmed by chest X-ray. Five other persons had X-ray evidence and eight had clinical findings suggestive of pneumonia. Thus, 23 persons had pulmonary complications. There was no correlation between occurrence of lower respiratory complications and the presence of potentially pathogenic bacteria in the throats of 38 patients from whom cultures were obtained.

Two deaths were attributed to complications of influenza during the St. Paul outbreak. A 78-year-old man developed pneumonia complicated by congestive failure 9 days after onset of influenza. He died on the 11th day of illness despite intensive antibiotic therapy. A 27-year-old man developed right, middle lobe pneumonia 3 days after onset of influenza. Although he was hospitalized and given massive doses of antibiotics, including penicillin, tetracycline, streptomycin, and chloramphenicol, he steadily became worse and died on the third hospital day. A pure culture of *Staphylococcus aureus*, which was resistant in vitro to the antibiotics administered, was obtained from

enza-like illnesses October 20 and 22, they were not considered to be sources of the outbreak. A third passenger (A. M.) had departed from the Navy base, Adak, Aleutian Islands, October 9, and had stayed overnight at Cold Bay while awaiting transportation to St. Paul. In Cold Bay, at noon time on October 10, he met the fourth passenger (S. M.) en route from Anchorage, where he had just been discharged from the Army. The two men were closely associated during the subsequent 3-hour delay at Cold Bay and the 2-hour flight to St. Paul.

Approximately 8 hours after arrival, A. M. developed an influenza-like illness and all members of his family subsequently had similar illnesses, four beginning October 12 and one October 15. Meanwhile, S. M. celebrated his discharge and was jailed at noon, October 11, for disorderly conduct. He remained in jail until October 29, except for visits to the clinic for treatment of an influenza-like illness which began October 12. He could not have been an effective source of illness to the village.

The evidence, therefore, indicates that A. M. was probably the source of the outbreak. In

Table 1. Occurrence of illness during St. Paul and Gambell influenza outbreaks, by age and sex, 1957

Age and sex	St. Paul		Gambell	
	Number ¹	Per cent	Number ¹	Per cent
<i>Age (years)</i>				
Under 1-----	7/11	64	12/13	92
1-4-----	39/44	89	41/42	98
5-9-----	42/45	93	53/56	95
10-14-----	45/48	94	33/36	92
15-19-----	21/27	78	13/14	93
20-29-----	47/59	80	30/39	77
30-39-----	41/50	82	22/32	69
40-49-----	31/39	79	19/24	79
50-59-----	12/17	71	15/18	83
60-69-----	6/15	40	14/15	93
70-79-----	3/3	100	7/8	88
80 and over-----			3/3	100
<i>Sex</i>				
Male-----	160/196	82	138/156	88
Female-----	134/162	83	124/144	86
Total-----	294/358	82	262/300	87

¹ Numerator represents persons with illness; denominator represents persons at risk.

Table 2. Occurrence of illness during the St. Paul influenza outbreak, by race according to age and sex, 1957

Age and sex	White		Aleut	
	Num-ber ¹	Per-cent	Num-ber ¹	Per-cent
<i>Age (years)</i>				
Under 5-----	0/2	0	46/53	87
5-19-----	3/4	75	105/116	91
20-39-----	3/10	30	85/99	86
40 and over-----	1/14	8	51/60	85
<i>Sex</i>				
Male-----	6/17	35	154/179	86
Female-----	1/13	8	133/149	89
Total-----	7/30	23	287/328	88

¹ Numerator represents persons with illness; denominator represents persons at risk.

view of the fact that the two servicemen were not closely associated after arrival in the village, it is possible that A. M. was infectious to S. M. during the incubation period (8-12 hours prior to onset of symptoms).

The airline schedule showed that influenza was probably introduced into Gambell October 31 when a flight arrived from Nome carrying four passengers, all residents of Gambell and members of the National Guard who were returning from a course of training at Fort Ord, Calif. Three of the guardsmen had influenza-like illnesses in California. Upon arrival in Anchorage October 30, the fourth passenger developed influenza-like symptoms which continued after his arrival in Gambell. Seven members of his household and three neighbors became ill November 1, 2, 4, 6, and 7. The evidence, therefore, suggests that the fourth passenger acquired influenza from exposure before arrival in Alaska and was the direct source of the outbreak in Gambell.

Patterns of Morbidity

Five hundred and fifty-six (84 percent) of 658 residents in both villages were ill during the outbreaks. Attack rates were slightly lower in St. Paul than in Gambell. However, there were similar patterns of attack by age

is available on such an outbreak on St. Lawrence.

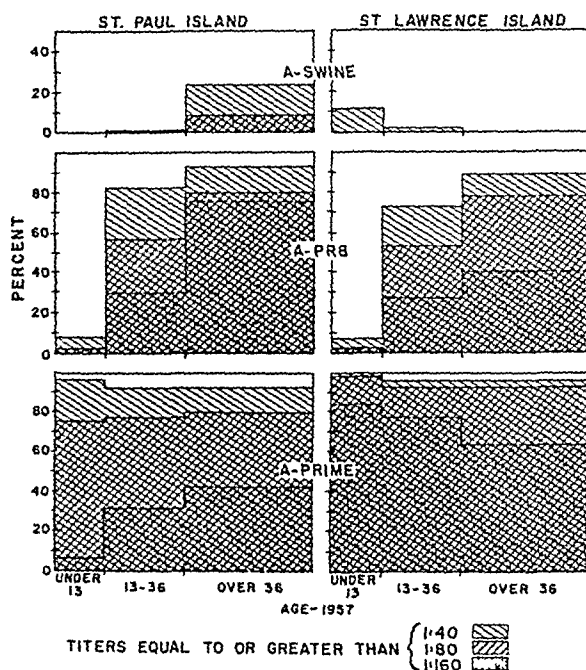
Nearly all persons tested in both villages had demonstrable antibodies to influenza A' indicating recent occurrence of the disease. Since serums were not obtained from very young children, the precise date of the last occurrence of influenza A' could not be determined.

Other Serologic Observations

Asian influenza infection rates could not be obtained by serologic methods because monovalent vaccines containing 200 chicken cell agglutinating (CCA) units of Asian virus per milliliter were administered during each outbreak. In St. Paul, two weekly 0.2-ml. doses of vaccine were given intracutaneously to each of 68 well persons beginning October 21, 12 days prior to onset of the last case. Likewise, single 0.1-ml. doses were given intracutaneously to 47 well Gambell residents, November 14, 4 days prior to onset of the last case. Obviously, there was insufficient time for vaccines to affect the course of the outbreaks. However, it was impossible to differentiate naturally acquired from artificially induced Asian strain antibodies among vaccinated persons.

Table 4 shows the distribution of HI titers to Asian influenza among vaccinated and nonvaccinated persons before and after the out-

Figure 5. Percentage of persons with stated preepidemic hemagglutination inhibition antibody levels to influenza A strains who were ill during St. Paul and Gambell influenza outbreaks, 1957.



breaks in each village. It is evident that demonstrable titers were infrequent and when present were low prior to the outbreak. In contrast, most nonvaccinated as well as vaccinated persons had demonstrable antibodies, generally of high titer, after the outbreaks.

Table 4. Distribution of hemagglutination inhibition titers against Asian (A/Jap/305) strain among St. Paul and Gambell residents before and after the 1957 influenza outbreaks

Place and time of titration	Number of serums tested	Number of serums with titers (reciprocals)						Percent 40 or higher of total tested
		Under 40	40	80	160	320	Over 320	
<i>St. Paul</i>								
1954: ¹								
Unvaccinated -- --	152	129	7	12	4	0	0	15
December 1957: ²								
Unvaccinated - - - - -	21	0	0	2	12	6	1	100
Vaccinated - - - - -	9	1	0	3	3	2	0	89
<i>Gambell</i>								
July 1957 ¹								
Unvaccinated -	85	80	3	2	0	0	0	6
February 1958: ²								
Unvaccinated -- -- --	100	24	10	16	32	14	4	76
Vaccinated - - - - -	25	6	2	4	7	3	3	76

¹ Before the outbreak. ² After the outbreak.

Table 3. Frequency of lower respiratory tract complications among Aleuts with illness during the St. Paul influenza outbreak, by age and sex, 1957

Age and sex	Total ill	Lower respiratory tract complications					
		Severe ¹		Mild ²		Total	
		Number	Percent	Number	Percent	Number	Percent
<i>Age (years)</i>							
Under 10.....	87	1	1	15	17	16	18
10-19.....	64	2	3	18	28	20	31
20-29.....	45	4	9	13	29	17	38
30-39.....	40	7	18	7	18	14	35
40-49.....	30	3	10	13	43	16	53
50-59.....	12	2	17	5	42	7	58
60 and over.....	9	4	44	1	11	5	56
<i>Sex</i>							
Male.....	154	14	9	39	25	53	34
Female.....	133	9	7	33	25	42	32
Total.....	287	23	8	72	25	95	33

¹ Patients who had either X-ray evidence of pneumonia or cough productive of "rusty" or "bloody" sputum, or both.

² Patients other than those classified "severe" who had chest pain, abnormal pulmonary signs, or productive cough, or both.

bronchial aspirations. It is presumed that death was due to an overwhelming secondary infection by this agent.

The proportion of St. Lawrence Eskimos who had pulmonary complications is not known. There were, however, no deaths, and the health department nurse gained the impression from clinical observation that complications were infrequent.

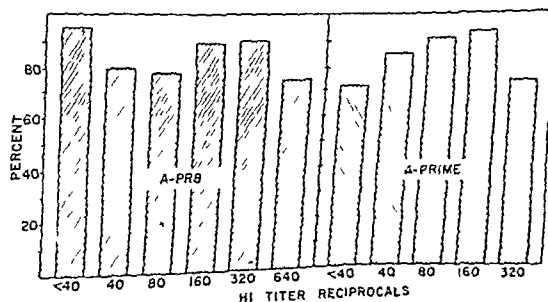
Prior Experience With Influenza

In view of the high morbidity during the two outbreaks, it was of interest to determine prior experience of these population groups with influenza A. There is, to our knowledge, no historical evidence that influenza occurred on St. Lawrence Island in 1918-19. Examination of medical logbooks, kept daily on all persons receiving clinical care on St. Paul Island during the years 1918-20, showed no evidence of an outbreak which could have been influenza. Figure 4 shows the proportion of persons in each village who had specific preepidemic HI antibody titers to preexisting strains of influenza A (including swine, A/PR8, and A') according to three broad age groups. The majority of persons tested in each village, includ-

ing those 37 years of age or older, had no demonstrable swine antibodies. These results may be contrasted with the serologic findings by Lackman that persons from Montana and Idaho who were born prior to 1920 had a high prevalence of swine antibodies (5).

Few persons in either village born after 1944 had demonstrable HI titers to A/PR8, whereas most persons born prior to 1944 had such antibodies. Several residents stated that an outbreak similar to that in 1957 occurred in St. Paul during the early 1940's. No information

Figure 4. Percentage of tested persons with preepidemic HI antibody titers equal to or greater than specified against influenza A strains of past years.



was no clinical evidence to suggest that any of the 23 cases of pneumonia in St. Paul were viral in origin or that the epidemic strain was any more virulent than Asian strains encountered elsewhere in 1957.

Summary

Asian influenza outbreaks occurred during October and November 1957 in the remote communities, St. Paul, Pribilof Islands, and Gambell, St. Lawrence Island, Alaska. Introduction of virus into each village could be dated precisely and in each instance was attributed to a returning serviceman.

Two hundred and ninety-four (82 percent) of 358 St. Paul residents and 262 (87 percent) of 300 Gambell Eskimos were ill during the outbreaks. Attack rates were higher among the Aleut than the white residents of St. Paul. Attack rates were higher among children than adults, but the difference was not so great as generally noted with Asian influenza.

The disease was generally mild and clinically similar to influenza noted elsewhere. There were two deaths in St. Paul. Pulmonary complications were somewhat more frequent than generally noted. There was, however, no evidence that such complications were viral in origin or that the epidemic strain of virus was more virulent than observed elsewhere.

Both villages had high prevalence, prior to the outbreaks, of HI antibodies to type A and A' influenza. Distribution of these antibodies by age indicated that type A influenza last occurred in 1943-44 and A' within recent years. Antibodies to the swine strain were infrequent in all age groups, and there was no historical evidence to indicate that influenza occurred in either community in 1918-19. Persons with type A and A' antibodies were as susceptible to illness during the outbreaks as persons without these antibodies. Prevalence of Asian influenza HI antibodies was low before but high after each outbreak.

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Serums were obtained during the outbreak in St. Paul from 16 persons with illness. Only three had demonstrable A/Jap/305/57 antibodies. Data not shown have established that there were no essential differences in prevalence of HI antibodies to the other influenza strains before and after the outbreaks.

The magnitude of the outbreaks in each village and the evidence that residents had had extensive experience with type A influenza in the past strongly indicate that prior infection conferred no immunity to influenza in 1957. Figure 5 shows the proportion of persons who were ill grouped according to their preepidemic HI antibody levels to A/PR8 and A' strains.

Discussion

Influenza morbidity rates were generally higher in 1957 than during any influenza epidemic in recent years. An estimated 25 percent of the population of the United States was attacked (6). Rates ranging from 10 to 70 percent were reported in population groups of varying composition and size elsewhere in the world (7-14). However, to our knowledge, illness rates during the St. Paul and Gambell outbreaks were as high as any thus far reported.

The fact that each outbreak arose from a single introduction of virus, the date of which could be identified, afforded unusual opportunity for identifying the precise time limits of virus activity in each community. On the basis of the short duration of 3 weeks and the sharpness of epidemic curves, as well as clinical characteristics of illness, there is no doubt that nearly all illnesses occurring within this time were influenza. This raises the question as to why influenza morbidity was so high in these population groups.

The frequent and intense exposure resulting from unusually close community ties was highly favorable for rapid and wide dispersion of Asian virus. There was daily contact between households either at work, at school, at church, at play, or during social activities.

Lack of experience with preexisting influenza A strains could not have been responsible for the high attack rates. Not only had residents of each village been exposed to type A and A' strains but they actually had a higher preva-

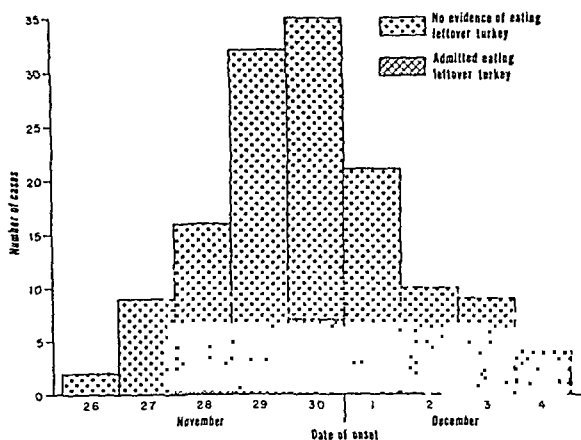
lence of HI antibodies than various population groups of comparable age in other Northwestern States (5).

The differences between attack rates in children and adults were not so striking as those noted by others (7, 10, 14, 15). Such differences are thought to reflect a broadening of experience with increasing age to the various antigenic components of influenza A virus (7). Older children and adults in these two villages had experienced both type A and A' infections, whereas young children had been exposed only to A' virus. However, there was no evidence on the basis of circulating HI antibody levels to indicate that past experience with either type A or A' strains reduced the risk of attack by Asian influenza. The degree of immunity may be related to intensity of exposure. It is possible that exposure was so intense during these outbreaks that immunity acquired from prior influenza A infections was not sufficient in most instances to prevent attack against the radically different Asian strain.

It was observed that swine HI antibodies were infrequent in St. Paul and absent in Gambell adults born prior to 1920. This is in contrast with the high prevalence of swine antibodies in this age group in most areas (5, 16-18). In a negative way this supports the hypothesis that a swine-like strain of influenza A virus was responsible for the 1918-19 pandemic since there was no evidence to indicate that the disease occurred in either community. This question is being investigated further during antibody surveys in other Alaskan native communities. In a small Indian village where approximately 20 percent of the population succumbed to influenza in 1918, all of 10 persons born prior to 1922 had swine HI antibodies in titers ranging from 1:40 to 1:320, whereas only 1 of 22 persons born after 1922 had such antibodies.

The frequency of pulmonary complications during the St. Paul outbreak was somewhat greater than that generally observed with Asian influenza (6, 7). However, severity of illness was not comparable to that during the 1918-19 pandemic or during the outbreak of influenza in 1949 among Eskimos of Victoria Island, Canada (19), where 20 percent died. There

Proportion of persons who admitted eating leftover turkey during outbreak of gastroenteritis.



An initial treatment of 2 gm. was given, followed by 1 gm. per day for 6 days.

The mess steward who sliced the turkey Thanksgiving morning became ill Friday afternoon, November 26. He reported that he had eaten a considerable amount of turkey while slicing it. His specimen was positive for *S. typhimurium*. This was apparently the first illness in the outbreak.

On November 29 and 30, illness was reported among some of the prison officers who on November 26 and 27 had eaten sandwiches which were prepared from turkey left from the Thanksgiving meal. Visits to the homes of the guards on sick leave revealed five ill persons, all of whom had eaten the turkey sandwiches but only one of whom had eaten turkey at the Thanksgiving meal. Cultures of specimens taken from all five were positive for *S. typhimurium*.

On the third day of the investigation, December 1, rectal swabs were obtained from 300 mess personnel who handled food. These swabs were placed in brilliant green tetrathionate broth. After incubation the broths were plated on brilliant green agar. Of these, 100, or 33 percent, were positive for *S. typhimurium*. About 40 percent of the persons infected denied enteric symptoms.

All of the infected food handlers were removed from mess duty and submitted specimens daily until two consecutive examinations were negative. The persistence of infections is shown in the table. Assuming infection oc-

curred on November 28, 30 percent of the patients harbored *S. typhimurium* for at least 14 days, and one person was positive after 4 months. Most of the individuals were not followed after two consecutive negative tests, but some who remained negative were continued at their request. No specimens were collected after 4 months.

Turkeys intended for the Thanksgiving dinner were delivered by a large meatpacking company on November 15. When, soon after delivery, the mess steward noticed that the turkeys were unfrozen, the supplier was requested to pick up these birds and to replace them with frozen turkeys. The replacements were received November 19, and the frozen turkeys were held at 28° F. until prepared in the prison butcher shop on November 24, the day before Thanksgiving. After roasting, the turkeys were returned to the butcher shop and sliced on the same chopping block where they were prepared for roasting. The block allegedly was cleaned with soap and water between the two operations.

Persistence of *Salmonella typhimurium* infection in 100 patients, determined by rectal swab culture

Days following infection	Patients with positive cultures	
	Number	Percent
Initial	100	100
14	30	30
24	13	13
45	6	6
65	3	3
100	1	1
121	1	1

Slicing began about one o'clock Thanksgiving morning, November 25, and continued until just prior to dinner. The slices were placed in large pans about 6 inches deep and weighed. The amount necessary for dinner was steamed at 220° F. under pressure for 10 minutes. The turkey not needed for the meal was returned to the refrigerator without reheating. Turkey which was not reheated and that which remained on the serving line after dinner was used for the officers' lunches. Apparently,

Outbreak of Gastroenteritis Caused by *S. typhimurium* Acquired From Turkeys

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AN OUTBREAK of gastroenteritis in a large, maximum-security penal institution afforded an opportunity to obtain additional evidence on the spread of *Salmonella typhimurium* by turkeys. In this instance the turkeys apparently were recontaminated after they were cooked.

Circumstantial evidence accumulated during recent studies indicates that fowl may be the vehicle of etiological agents in some outbreaks of diarrhea (1-5). Seldom, however, have the epidemiological indications been corroborated by bacteriological data, partly because the suspected items of food were not available when investigations were undertaken.

Nevertheless, it is manifest from observations that fowl may serve as the vehicle of *Salmonella*. In a study by Mosher and others (6) turkeys were implicated as the source of *Salmonella* infections on epidemiological grounds. In a 5-year study of the occurrence of *Salmonella* in fowl, Galton and associates recovered the organism from 14.5 percent of 434 chickens and turkeys examined (7). In one phase of the study they found that 16 percent of 1,244 specimens from fowl in 3 poultry processing plants were positive for *Salmonella*. The highest percentage of isolations were from the edible viscera, and *S. typhimurium* was the most prevalent type.

Description of the Outbreak

The outbreak first became evident during the afternoon and evening of November 27, 1954, when a number of prisoners reported to the hospital clinic complaining of severe nausea, vomiting, cramps, and diarrhea. Temperatures ranged from 99.6° F. to 104° F., and white

blood cell counts from 10,000 to 14,000 per cubic millimeter. No gross blood was noted in the stools. The illness was short except for those patients with sustained fever. Reports of illness characterized by these symptoms continued through November 30. Approximately 200 cases among the 2,700 prisoners were reported, 30 of the patients requiring hospitalization. Most of the ill persons were among the 300 men who worked in the prison mess or in the hospital.

Although an epidemic of food poisoning, presumably caused by *Salmonella*, was suspected when the first series of cases was reported, food histories obtained initially yielded few clues. The turkey left over from Thanksgiving dinner on November 25 was suspected since the prisoners involved had access to the kitchen and could have taken leftover food. This suspicion was confirmed later by two patients who reported that they were offered turkey sandwiches by fellow prisoners on November 27. In an unsigned questionnaire completed December 3 by 155 of the prisoners who had been ill, 25 admitted eating turkey other than that served at the Thanksgiving meal (see chart).

On November 29, when intensive investigation of the epidemic began, specimens on rectal swabs were obtained from 20 of the more acutely ill patients in the hospital. These were plated directly on SS agar and inoculated into tetrathionate broth to which brilliant green dye was added. After 18 hours incubation at 37° C., the broths were streaked to brilliant green agar. Sixteen, or 80 percent, of these cultures were positive for *S. typhimurium*. In vitro disk sensitivity tests indicated that the organisms isolated were sensitive to oxytetracycline. Therapy was started by administering this drug to 21 patients who had sustained fever.

Mr. Mackel, bacteriologist-epidemiologist, and Dr. Payne, an epidemiologist, were with the Enteric Disease Investigations Unit, Epidemiology Branch of the Communicable Disease Center, Atlanta, Ga., at the time of this study. Dr. Payne was chief of the unit. Both are currently assigned to the Communicable Disease Center Field Station, Phoenix, Ariz. Dr. Pirkle is medical director, Bureau of Medical Services, Atlanta.

Legal note . . . Municipal Control of Air Pollution

Constitutionality of Detroit Smoke Control Ordinance upheld in case involving municipal control of air pollution by vessels in interstate commerce. *Huron Portland Cement Co. v. City of Detroit*, 93 N.W. 2d 888 (1959).

The Smoke Abatement Code of the City of Detroit makes it unlawful to permit the emission within that city of smoke of a density equal to or greater than that designated as No. 2 on the Ringlemann Chart, and provides penalties for its violation.

A complaint filed by the city charged the Huron Portland Cement Co. with permitting two of its steamships operating in interstate commerce to emit dense smoke at the Port of Detroit contrary to the provisions of the code. The company then sued to enjoin the prosecution of the complaint, claiming the ordinance unconstitutional except insofar as any objectionable smoke was caused by the improper firing or other improper use of the equipment of the vessel. The court denied the injunction and held that the ordinance was constitutional. The company then appealed to the Supreme Court of the State of Michigan, claiming that (a) in the exercise of its power to control interstate commerce Congress had preempted the field by providing for inspection and control of American vessels on the Great Lakes, and (b) even if there had been no preemption by congressional action, the Detroit ordinance unduly burdened interstate and foreign commerce in matters where uniformity was necessary. The Supreme Court of Michigan rejected the contentions of the company and upheld the ordinance.

The constitutional grant of authority in Congress to regulate interstate and foreign commerce, the court noted, does not preclude all State action which may indirectly or incidentally affect that commerce. Unless it conflicts with or is superseded by legislation of Congress in the exercise of its superior authority in this

area, and as long as its effect on interstate commerce is only indirect and incidental, legitimate and reasonable State action with respect to a matter of local or internal concern is valid as an exercise of the police power of the State.

The court declared that the Federal legislation involved (46 U.S.C.A. Ch. 14) was intended primarily for the protection and safety of vessels, their passengers, crew, and cargo, and not designed or enacted for the protection of persons or property on land. The Smoke Abatement Code, the court held, was, on the other hand, intended solely to protect the health and welfare of the residents of Detroit by preventing the emission of dense smoke into the air, and it was not intended as a regulation of interstate commerce. In view of the differing subject matter, the Federal and local laws were thus held not to be in conflict, and the effect, if any, of the local ordinance on interstate commerce was declared to be only incidental to its purpose.

Turning to the question of the appropriateness of local air pollution ordinances as a reasonable exercise of the police power, the court stated that "by now it is sufficiently clear without citation of authority that excessive air pollution by dense smoke cannot be anything but harmful to the health and welfare of the community." The court also noted the increasing national concern with air pollution and referred to the Federal Air Pollution Research and Technical Assistance Act of 1955 (42 U.S.C. 1857) as indicating congressional approval and encouragement of local action to abate air pollution.

Recognizing the needs of our industrial society, however, the court concluded that a smoke

large amounts of this turkey also were obtained surreptitiously by the prisoners.

With the assistance of officials from the Food and Drug Administration, swabs were taken from various areas in the kitchen on November 30. The meat chopping block, other utensils, and the handles of knives used in cutting the meat were examined. Swabs were placed in brilliant green tetrathionate broth and streaked to brilliant green agar. All the cultures were negative for *Salmonella*.

None of the sliced turkey was available for examination, but the uncooked necks had been frozen for use in soup. One dozen of the frozen necks were selected randomly, divided into four pools, and homogenized in a food blender with 150 ml. of brilliant green tetrathionate broth in each pool. *S. typhimurium* was recovered from one of the four pools.

Discussion

Epidemiological and bacteriological data indicate that this outbreak of gastroenteritis was caused by turkey meat infected with *S. typhimurium*. The case studies indicate that illness occurred only in the group who had eaten the turkey which was not reheated after being sliced. This strongly suggests that (a) the turkeys were infected originally, (b) the chopping block was contaminated when the birds were prepared for roasting, and (c) the cooked birds were recontaminated from the chopping block. Reheating apparently was sufficient to destroy *Salmonella* on the contaminated meat.

The severity and duration of symptoms in this outbreak are consistent and characteristic of *S. typhimurium* infections. Patients treated with oxytetracycline responded well clinically. The persistence of infections compares closely with those reported by Mosher and others (6),

who observed an infection 4 months after the beginning of an outbreak.

Summary

Studies were made of an outbreak of gastroenteritis involving about 300 inmates of a penal institution. All of the patients investigated had eaten roasted turkey which had been sliced on the same chopping block on which the uncooked fowl had been prepared. No other persons became ill after eating only reheated meat from the same birds.

Salmonella typhimurium was recovered from more than 100 persons who had eaten the contaminated meat and from turkey necks which had been frozen.

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Legal note . . . Municipal Control of Air Pollution

Constitutionality of Detroit Smoke Control Ordinance upheld in case involving municipal control of air pollution by vessels in interstate commerce. *Huron Portland Cement Co. v. City of Detroit*, 93 N.W. 2d 888 (1959).

The Smoke Abatement Code of the City of Detroit makes it unlawful to permit the emission within that city of smoke of a density equal to or greater than that designated as No. 2 on the Ringlemann Chart, and provides penalties for its violation.

A complaint filed by the city charged the Huron Portland Cement Co. with permitting two of its steamships operating in interstate commerce to emit dense smoke at the Port of Detroit contrary to the provisions of the code. The company then sued to enjoin the prosecution of the complaint, claiming the ordinance unconstitutional except insofar as any objectionable smoke was caused by the improper firing or other improper use of the equipment of the vessel. The court denied the injunction and held that the ordinance was constitutional. The company then appealed to the Supreme Court of the State of Michigan, claiming that (a) in the exercise of its power to control interstate commerce Congress had preempted the field by providing for inspection and control of American vessels on the Great Lakes, and (b) even if there had been no preemption by congressional action, the Detroit ordinance unduly burdened interstate and foreign commerce in matters where uniformity was necessary. The Supreme Court of Michigan rejected the contentions of the company and upheld the ordinance.

The constitutional grant of authority in Congress to regulate interstate and foreign commerce, the court noted, does not preclude all State action which may indirectly or incidentally affect that commerce. Unless it conflicts with or is superseded by legislation of Congress in the exercise of its superior authority in this

area, and as long as its effect on interstate commerce is only indirect and incidental, legitimate and reasonable State action with respect to a matter of local or internal concern is valid as an exercise of the police power of the State.

The court declared that the Federal legislation involved (46 U.S.C.A. Ch. 14) was intended primarily for the protection and safety of vessels, their passengers, crew, and cargo, and not designed or enacted for the protection of persons or property on land. The Smoke Abatement Code, the court held, was, on the other hand, intended solely to protect the health and welfare of the residents of Detroit by preventing the emission of dense smoke into the air, and it was not intended as a regulation of interstate commerce. In view of the differing subject matter, the Federal and local laws were thus held not to be in conflict, and the effect, if any, of the local ordinance on interstate commerce was declared to be only incidental to its purpose.

Turning to the question of the appropriateness of local air pollution ordinances as a reasonable exercise of the police power, the court stated that "by now it is sufficiently clear without citation of authority that excessive air pollution by dense smoke cannot be anything but harmful to the health and welfare of the community." The court also noted the increasing national concern with air pollution and referred to the Federal Air Pollution Research and Technical Assistance Act of 1955 (42 U.S.C. 1857) as indicating congressional approval and encouragement of local action to abate air pollution.

Recognizing the needs of our industrial society, however, the court concluded that a smoke

control ordinance may be said to be reasonable if it does not unduly hamper industry. Thus, the court conjectured, if the ordinance had attempted to prevent the emission of all smoke or if adequate means of smoke control were not available, another question might have been raised. The Detroit ordinance, however, the court pointed out, sought to outlaw only the emission of smoke of such density as to be readily prevented by the use of modern smoke equipment. The court stated, "All it costs is money." It concluded that the ordinance was a reasonable exercise of local police power and did not unduly interfere with interstate commerce.

With respect to the company's second contention, the need for uniformity, the court reasoned that the Detroit ordinance should not be held invalid simply because of the possibility that ordinances at other ports, applicable to the company's vessels, might be more stringent and require changes in equipment. It was suggested that the company might avoid this possibility by employing the most modern devices available to reduce smoke to the least possible density. Although the court conceded that the subject might well call for uniform Federal legislation, short of such action, the court held the Detroit ordinance was within the proper exercise of the police power.

A Bulwark Against Senility

Philadelphia has undertaken a constructive experiment to prevent mental deterioration among the aged.

In an effort to demonstrate that senility is not inevitable and can be prevented, the Frederic R. Mann Recreation Center was opened in November 1958. The first of its kind in the Nation, the center provides to adults 60 years of age and older who are capable of traveling to and from the center unaided, the services of an occupational therapist, three recreation leaders, a psychiatrist, psychologist, psychiatric social worker, public health nurse, and physician. It has a capacity of 200.

The idea grew from studies by Dr. Maurice E. Linden, director of mental health in the Philadelphia Department of Public Health, who found that one-third of all mental hospital admissions in the city were in the upper age group.

Dr. Linden has long held that senility is a misnomer. It is his belief that aged persons need not break down mentally if they are given a constructive social environment and opportunity to develop hobbies and other occupational, mental, and social interests.

The center is a cooperative enterprise of the Pennsylvania State Department of Public Welfare and the Departments of Public Health and Recreation of Philadelphia.

An article describing the center's activities will appear in a forthcoming issue of *Public Health Reports*.

Signs

and

Symptoms

of trends in public health

Hot and humid working conditions increase fatigue in workers, endanger their health, and diminish their efficiency, observes Dr. Lucien Brouha of the Haskell Laboratory of Industrial Toxicology, Wilmington, Del.

He points out the need for efficient ventilation, properly insulated sources of heat, screens, special clothing, and special tools and methods to enable men to work as far as possible from a source of heat, rest periods in cooled and dehumidified air, and a measured intake of water in the right quantity and at the right time.

Water should be drunk from cups, he says, to cut down on amount of swallowed air and to permit measurement. He feels also that salt loss can generally be offset by adding enough salt to the food at every meal.

« »

The first positive proof that mammalian embryos are extremely sensitive to X-rays in the earliest phases of development following conception has been obtained by Columbia University radiobiology researchers, Prof. Roberts Rugh and his assistant Erica Grupp.

« »

Experiments on fish suggest that an outlet for primary aggressiveness may be as important as love. Dr. Konrad Lorenz, head of the Max Planck Institute for Comparative Ethnology, found that the cichlid, a tropical fish, will kill his mate unless other fish are around as victims. The attack need not be physical; the cichlid needs only to see other fish for his aggressions to have an outlet.

More than a third of 88 million automobile drivers in this country have below-average vision, and 15 percent of that group have eyesight so poor they are dangerous drivers, the Better Vision Institute reports. One major criticism of standard eye tests for licenses, they said, is that both examinee and chart are motionless, without regard to the effect of speed on visual perception.

« »

According to the New York Interdepartmental Health Resources Board, 4 out of 5 hospitals in New York State, and 9 out of 10 in New York City, refuse to admit alcoholics.

« »

The Office of Vocational Rehabilitation reports a record of 74,320 persons rehabilitated during fiscal year 1958, 3,380 more than in 1957. An additional 18,534 have been prepared for work but have not yet found employment.

Estimates indicate that the men and women rehabilitated during the year will increase their earnings from \$22 million to about \$148 million in their first full year of employment. They will contribute about 114 million man-hours to the Nation's labor force.

Nearly 15,000 of these people had been receiving public assistance at an annual cost of \$14 million, whereas the total, one-time cost of rehabilitating them was about \$13 million.

« »

Vermont's Alcoholic Rehabilitation Commission uses brief case histories and entries from the journal of a caseworker in the latest report on its activities.

The new alcoholics' rehabilitation program in Washington, D.C., has resulted in a saving of \$12,000 a month, municipal court officials estimate. At least 150 persons per month are referred for treatment instead of being sent to prison, not only helping alcoholics but saving jail costs of \$2.87 a day per patient.

« »

A 2-year study by the New Jersey State National Council indicates that 4 out of 5 New Jersey teenagers eat poorly, but boys are better nourished than girls. Only 1 out of 10 high school girls drinks enough milk, and more than one-fourth of the girls and one-seventh of the boys had eaten no breakfast the day before they were questioned. Many lack vegetables and fruits rich in vitamin C in their diets.

« »

Aged stroke victims are walking out of D.C. General Hospital in Washington, D.C., capable of complete self-care. Of 3,000 stroke victims admitted to the hospital in the last 8 years, 90 percent responded to vigorous restorative treatment. Their stay in the hospital has been cut in half with treatment and, when released, they remain active in their homes.

The patients who retrogressed after leaving the hospital were found to be in homes of well-meaning but ill-informed relatives who insisted that the stroke victim return to bed.

« »

One in six of New York's families is ill-clothed, ill-housed, and ill-fed, finds the State's Interdepartmental Committee on Low Incomes. The committee urges more attention to rehabilitation of the aged, the handicapped, and the mentally ill in a war against poverty.

« »

Slipping and tripping, rather than stumbling on obstructions, are the chief causes of falls on steps and stairways in farm homes, reports the Michigan Experiment Station, U.S. Department of Agriculture. The finish or covering material on stairs and the uniformity of steps are important safety considerations.

control ordinance may be said to be reasonable if it does not unduly hamper industry. Thus, the court conjectured, if the ordinance had attempted to prevent the emission of all smoke or if adequate means of smoke control were not available, another question might have been raised. The Detroit ordinance, however, the court pointed out, sought to outlaw only the emission of smoke of such density as to be readily prevented by the use of modern smoke equipment. The court stated, "All it costs is money." It concluded that the ordinance was a reasonable exercise of local police power and did not unduly interfere with interstate commerce.

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aration of shellfish for marketing, and control of harvesting from closed areas. Information on bacteriological criteria and inspection of certified shippers is provided in the appendixes.

A companion to PHS Publication No. 33, part II, 1957 revision, this manual supersedes its 1946 edition. Both parts were prepared with assistance from State shellfish control agencies, industry associations, and interested U.S. and Canadian Federal agencies.

Indians on Federal Reservations in the United States. A digest. Aberdeen Area. PHS Publication No. 615, part 3; 1959; 73 pages.

Brief information about Federal Indian Reservations in Nebraska, North Dakota, South Dakota, Iowa, Michigan, Minnesota, and Wisconsin is contained in this digest. The population groups, their homes, education, and income, and their health status and services are discussed. Included also is a description of the location, ownership, and topography of reservation land.

Review of the Second Conference on Progress and Potentials in Leprosy Investigations. PHS Publication No. 641; 1958; 36 pages.

Abstracts of selected papers provide a brief review of conference highlights. A substantial portion discuss the deficiencies in knowledge about leprosy. Other reports deal with clinical observations, evaluation studies, and the epidemiological and immunological aspects. The discussions of obscure mycobacterial diseases of man and animals are also covered.

Bibliography of Military Psychiatry, 1952-1958. PHS Publication No. 693; 1959; by Charles Roos and Jeannette Barry; 83 pages.

A continuation of the "Bibliography of Military Psychiatry, 1947-52," these 736 references relate directly to the military situation or involve United States military personnel. They are arranged in 17 categories and many are briefly annotated. An author index is provided.

Although intended primarily for military psychiatrists and psychologists, this bibliography should be a useful tool for civilian mental health personnel and medical librarians.

Seasonal Variations of Births in the United States, 1948-54. *Vital Statistics—Special Reports; Selected Studies*; vol. 47, No. 4; Apr. 24, 1959; pages 127-143.

Current seasonal patterns in the birth rate are obtained and comparisons made between the years covered and earlier years. Supported by tables and charts, they show variations between races and different geographic regions of the Nation.

Derivation of a seasonal index and its use in adjusting series of monthly birth rates are demonstrated. Types of fluctuations and different methods of computing the index are also considered.

Highlights of Progress in Mental Health Research, 1958. PHS Publication No. 659; 1959; 40 pages; 20 cents.

Selected studies by the National Institute of Mental Health's scientists and grantees during 1958 are described. Areas covered include biological and behavioral aspects of schizophrenia, biochemical bases of behavior, brain and behavior, learning and perception, psychopharmacology, and drugs and behavior. Epidemiology, personality development, the child's relation to his family, the disturbed child, alcoholism, aging, and psychosomatics are also included.

The work and findings discussed point up the multidisciplinary approach that has characterized mental health research during the past few years.

Grant and Award Programs of the Public Health Service. Volume I. Policy and information statement on research grants. PHS Publication No. 415; revised 1959; 19 pages.

Purpose and availability, application procedures, restrictions, and other details are described. In addition to general information, spe-

cific information is given about grants for pilot projects, constructing and equipping health research facilities, and field investigations in cancer, neurological and sensory disorders, and mental health.

Organization and Staffing for Local Health Services, January 1, 1958. PHS Publication No. 682; 1959; by Clifford H. Greve and Josephine R. Campbell; 60 pages; 40 cents.

The organization and staffing of 1,480 local health units are analyzed.

Tables and charts show extent of coverage of the Nation by local health organizations, selected characteristics of organized areas, financial capacity of those areas and their expenditures for public health, and public health personnel employed by official health agencies and by other official agencies.

VD Fact Sheet. PHS Publication No. 341; 15th revision; 1959; 22 pages. Latest statistics on venereal disease incidence, prevalence, and treatment. Supersedes previously published data.

Tuberculosis. PHS Publication No. 30 (*Health Information Series No. 33*); revised 1959; 13 pages; 10 cents, \$6.50 per 100. Revised to emphasize the newest developments in detection and treatment. Also describes the bacillus, its transmission, and the course of the disease, dispelling many popular beliefs about tuberculosis.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

Federal Publications

Natural Fluoride Content of Communal Water Supplies in the United States. *PHS Publication No. 655; 1959; 111 pages; 60 cents.*

The 1,903 communities listed in this census of naturally fluoridated water supplies have at least one water source containing 0.7 ppm or more fluoride, the minimum level for optimum protection from dental caries.

Statistical information is presented for naturally fluoridated water sources by fluoride content, State, and size of community.

Health Statistics From the U.S. National Health Survey. Impairments by type, sex, and age. United States, July 1957-June 1958. *PHS Publication No. 584-B9; 1959; 28 pages; 25 cents.*

Estimates of visual, hearing, and speech defects, loss of extremities, paralysis, and other neurological or orthopedic defects and abnormalities are presented. The tables show impairments involving bed disability days and the number and percent of impairments caused by injury. Medical care status and major activity of handicapped persons are also tabulated.

Appendixes carry technical notes on methods, definitions, and coding classifications, and the questionnaire on which the information was obtained.

Annual Report, U.S. Department of Health, Education, and Welfare, 1958. *HEW Publication (Unnumbered); 1959; 262 pages; 75 cents.*

Progress and cooperation comprise the theme of the Secretary's report to the President.

Activities of the Social Security Administration, Public Health Service, Office of Education, Food and Drug Administration, Office of Vocational Rehabilitation, and Saint Elizabeths Hospital are described in detail. Short discourses on the functions of the American Printing

House for the Blind, Gallaudet College, and Howard University are also presented.

Pointing out that international programs exist in all phases of the Department's work, the report emphasizes the basic needs of all peoples.

Glaucoma References. *PHS Publication No. 664; 1959; 15 pages; 10 cents.*

Methods used in diagnosing early glaucoma, medical and surgical treatment, hereditary and geriatric factors, glaucoma surveys, community casefinding programs, and vision conservation programs are the major topics of this annotated bibliography for professional workers and students in the field of public health.

Pertinent films and pamphlets are also cited with brief descriptions of their content, use, and availability. Annotations are grouped under the major categories of community aspects, clinical aspects, films, and pamphlets.

Salaries of Local Public Health Workers, August 1958. *PHS Publication No. 656; 1959; 40 pages.*

Data in this report, taken from questionnaires submitted to local health departments, boards of education, and nonofficial health agencies, cover salaries of some 12 occupational groups of professional personnel. Frequency distributions of salaries are shown by population of area served and by Bureau of Census region.

Scientific Directory and Annual Bibliography, National Institutes of Health, 1959. *PHS Publication No. 667 (Public Health Bibliography Series No. 24); 1959; 100 pages.*

Listing all key personnel, staff members with doctorate degrees, and visiting scientists with tenure of a year or more, the directory reflects the organizational structure of the

National Institutes of Health, Public Health Service, as of February 1959.

The bibliography itemizes papers published during 1958 which present original work of scientists at the Institutes. Alphabetized by senior author with the entries listed under the organizational entity to which he was attached when the work was done, it indicates the accomplishments of each unit.

Individual contributions are recognized in the alphabetical index of all authors and names in the directory.

The National Cancer Institute. *PHS Publication No. 458; revised 1959; 24 pages; 20 cents.*

Organization and functions of the National Cancer Institute, National Institutes of Health, are discussed in detail. Included are descriptions of the types of research conducted, the national chemotherapy program, and programs to assist in early diagnosis and treatment of cancer. Specific information is given about professional training and research grants.

Screening for Glaucoma. *PHS Publication No. 666; 1959; 23 pages; 25 cents.*

Eight glaucoma detection programs conducted in various communities prior to February 1957 are described. Directed to those planning casefinding surveys, this booklet covers sponsorship, test population and procedures, referral, and followup techniques.

A summary of operations and findings is given for each program discussed.

Manual of Recommended Practice for Sanitary Control of the Shellfish Industry. Part I. Sanitation of shellfish growing areas. *PHS Publication No. 33; revised 1959; by Eugene T. Jensen; 36 pages; 45 cents.*

Administrative and technical procedures for the States, Public Health Service, and shellfish industry are suggested. Separate sections deal with laboratory methods, growing area survey and classification, prep-

An evaluation of narcotics controls discloses that our Nation's statutes are not sufficiently flexible in view of new discoveries in synthetic analgesics. Suggested changes include a redefinition of addiction and uniform national and international laws.

Addiction Liability and Narcotics Control

NATHAN B. EDDY, M.D., and HARRIS ISBELL, M.D.

AMONG the most effective measures for the prevention of drug addiction are the Federal laws and international treaties controlling the production and distribution of the drugs of addiction and the source materials from which these drugs are derived. The application and administration of these laws have steadily become more complex. A large number of synthetic drugs with pharmacological effects and addiction liability similar to that of morphine have been discovered and have created some difficult problems of classification and control. It is now also known that substances, such as the barbiturates and the amphetamines, covered by the food and drug but not by the narcotic laws, are susceptible to abuse and may produce a different addiction from that caused by the opiates. It is the purpose of this paper to review the historical origin of the present narcotic laws and to discuss changes in them which seem desirable in the light of recent knowledge.

Definition of Addiction

In 1950, at the request of the Commission on Narcotic Drugs of the United Nations, the Ex-

Dr. Eddy is chief, Section on Analgesics, National Institute of Arthritis and Metabolic Diseases, and Dr. Isbell is director, Addiction Research Center, National Institute of Mental Health, Public Health Service.

pert Committee on Addiction-Producing Drugs of the World Health Organization drafted a definition of addiction (1). The committee said, "Drug addiction is a state of periodic or chronic intoxication, detrimental to the individual and to society, produced by the repeated consumption of a drug (natural or synthetic). Its characteristics include: (1) an overpowering desire or need (compulsion) to continue taking the drug and to obtain it by any means; (2) a tendency to increase the dose; (3) a psychic (psychological) and sometimes a physical dependence on the effects of the drug."

In its third report (2) in 1952, the expert committee wrote an explanation of the characteristics of addiction designed particularly to express its view on a distinction between addiction and habituation. In 1957, to clarify further this distinction, the expert committee reworded its definition of addiction without material change in its meaning (3).

This definition received some acceptance but also much criticism. It was not meant to be pharmacological, nor strictly speaking scientific, but practical, and was intended to include the diverse substances currently under international narcotics control. State and national narcotics laws and regulations and international narcotics conventions are designed to prevent or at least limit abuse of cocaine and marihuana as well as of opium and the potent analgesics. Though all of these substances are commonly and loosely termed narcotics, their properties

QUESTIONS AND ANSWERS ON SMALLPOX AND VACCINATION

By J. P. LEAKE, Surgeon, United States Public Health Service

The following questions are not infrequently asked by physicians in regard to variola and its prevention. Part of the answers given are supported by good evidence, part by conclusive evidence, but much, unfortunately, is only opinion, a personal weighing of such evidence as is at hand; yet each of the questions should have a tentative answer, according to the best light available. Further information may change the answers given here. Though for nearly every statement that can be made concerning smallpox some support can be found in the literature, a few of the observations here recorded are original. It is hoped that many of the gaps in our knowledge of smallpox and vaccination may soon be filled. Of all infectious diseases prevalent in the United States this disease is the most completely preventable by public health measures.

1. *What is the best method of vaccination?*

Probably the "multiple pressure or prick" method.¹ This consists of a shallow, tangential pricking of the cleansed, but not irritated, skin with a needle, through a drop of smallpox vaccine, covering an area not greater than one-eighth of an inch (3 millimeters) in diameter. This gives little chance of accidental infection and the eruption is typical. Acetone

JANUARY 28, 1927, pp. 221-238

Dr. J. P. Leake provided specific and detailed answers to 23 questions about smallpox. He covered vaccination techniques, reactions, and complications, the necessity and methods for protecting vaccine potency, and the diagnosis, course, and virulence of the disease.

ics of the National Research Council discussed the problem at length at its 20th meeting, January 11, 1959, and passed unanimously a resolution embodying its views (5).

International Control

The first effective effort toward obtaining international action to control the traffic in opium and the dangerous drugs obtained therefrom was the conference of the International Opium Commission convened in Shanghai in February 1909, on the initiative of the U.S. Government. The successive steps or agreements on international narcotics control, again reflecting the development of thought on this problem, have progressed as follows:

International Opium Convention of 1912. Designed to bring about the gradual suppression of the abuse of opium, morphine, and cocaine, as also of the drugs prepared or derived from these substances which give rise or might give rise to similar abuses. The contracting parties agreed to enact effective laws or regulations for the control of the production and distribution of raw opium. A less definite obligation was imposed with respect to smoking opium, and the contracting parties' best efforts were to be used with respect to morphine and cocaine and their salts to restrict their import and export to authorized persons and to enact laws limiting exclusively to medical and legitimate purposes the manufacture, sale, and use of these dangerous drugs.

Geneva Narcotics Convention of 1925. Intended to impose somewhat more specific obligations with respect to control of national and international trade. It established the Permanent Central Opium Board to watch continuously the course of international trade in the drugs covered by the 1912 convention, collect and examine statistics, and obtain and communicate to all parties explanations of apparently excessive accumulations of the dangerous drugs in any country.

Convention of 1931. Limited the manufacture and regulated the distribution of narcotic drugs by requiring all countries, whether or not parties to the convention, to supply annual estimates of their needs of stated derivatives of opium and coca leaves, based solely on medical

and scientific requirements. Thereafter, each country was obligated to limit its manufacture of each of the drugs in accordance with its estimate and to supply periodically to the Permanent Central Opium Board statistics of actual manufacture, consumption, importation, and exportation of those drugs. In other words, the convention contemplated the adjustment of world manufacture to legitimate world demand, the control of all channels of distribution, both national and international, and provision for a recording system of all narcotic drug operations. It entrusted to international organizations the task of supervising and coordinating throughout the world. The convention specified the drugs to be controlled and made some provision for additions to the list.

Protocol of 1946. Transferred to the Commission on Narcotic Drugs of the United Nations Economic and Social Council the functions previously carried out by the Opium Advisory Committee of the League of Nations.

Protocol of 1948. Established an international procedure, analogous in principle to that of our Opiates Act of 1946, whereby new drugs found to have dangerous addiction liabilities are promptly brought under the control imposed by the 1931 convention, the definitive finding in this case being made by the World Health Organization.

Opium Protocol of 1953. Designed to limit definitely the production of opium to medical and scientific needs and to establish the areas of production and sources of world supply. This protocol has not yet become effective.

Single Convention. Originally intended to incorporate into a single agreement by codification the provisions of the various international narcotics conventions but actually undergoing elaboration. It is still in the drafting stage.

Need for Flexibility

It is apparent that, initially, thought and effort toward narcotics control were centered upon the crude materials, opium and coca leaves, or upon the potent drugs obtained from them, morphine and its derivatives and cocaine. In the United States marihuana was added to the list of substances controlled because of evidence

differ so widely that they are similar only in being subject to abuse and in creating social dangers. Of necessity, any definition attempting to cover all of them had to be very broad.

National Control

When control was first considered (1909-12) and for a considerable time thereafter, only cocaine and opium and its alkaloids were taken into account. Their abusive use was recognized and considered of sufficient importance to warrant strict control, even at the expense of placing a burden upon drug manufacturers, pharmacists, and physicians, as well as upon the government which had to implement the control. Relatively few individuals abused both opiates and cocaine, the effects of which are different and in some respects opposite; yet both were called narcotics and both were subjected to the same control measures.

An excellent chronological review of the steps in the development of national and international control of narcotic drugs was published in 1953 (4).

Merely listing the principal acts of Congress on this subject with their chief intent will indicate the progress of events and the development of thought on the problem of control:

February 9, 1909. Prohibition of importation of opium and its preparations and derivatives except for medicinal purposes and absolute prohibition of importation of smoking opium.

January 17, 1914. Prohibition against exportation of opium and cocaine and salts, and derivatives and preparations thereof, except to a country which regulated the entry of such drugs; absolute prohibition of exportation of smoking opium.

January 17, 1914. Prohibitive tax upon opium manufactured for smoking purposes.

December 17, 1914. Harrison Narcotic Law, an internal revenue measure by tax and registration limiting the availability of narcotic drugs to medical and scientific uses, and regulating production, manufacture, and distribution, through channels of medical supply to the dispensing registrants, the qualified practitioner, and druggist.

May 26, 1922. Narcotic Drugs Import and

Export Act, an extensive revision of the act of 1909 authorizing the importation of such quantities only of opium and coca leaves as were found to be necessary for medical and legitimate needs. Importation of any form of narcotic drug except crude opium and coca leaves was prohibited. Exportation of manufactured drugs was permitted under a system of control designed to assure their use for medical needs only in the country of designation.

June 7, 1924. Amendment to the Narcotic Drugs Import and Export Act prohibiting the importation of opium for the manufacture of heroin.

June 14, 1930. An act establishing the Bureau of Narcotics in the Department of the Treasury.

August 2, 1937. The Marihuana Tax Act. Imposition of registration and occupational tax on all persons who produced, imported, manufactured, sold, or transferred marihuana.

August 9, 1939. Contraband Seizure Act, authorizing confiscation of any vessel, vehicle, or aircraft used to facilitate transportation and so forth of contraband narcotics or marihuana.

December 11, 1942. Opium Poppy Control Act, prohibiting the growth of the opium poppy in the United States, except under special license issuable when need is shown for domestic production for medical and scientific uses.

July 1, 1944. A statute making the Federal narcotic laws applicable to pethidine (meperidine, Demerol) under the statutory designation "Isonipeccaine."

March 8, 1946. The Opiates Act, or Robertson Amendment, establishing a general procedure for the expeditious application of control measures to any drug found to be dangerous from the addiction-liability standpoint.

1955-59. The Karsten bill, designed, among other things, to implement our obligation under the 1948 protocol to bring new substances under narcotic control. This bill is still pending. Consideration is being given to its possible amendment looking to greater flexibility in our system of narcotics control, tailoring, so to speak, the degree of control to the degree of risk to public health. Among those giving thought to the desirability of such amendment, the Committee on Drug Addiction and Narcot-

conditions any such agent could be controlled only in the same manner as morphine, our narcotics laws are in a sense hampering the search for a nonaddicting pain-relieving drug.

Clinical experience and direct addiction experiments indicate that cocaine does not produce physical dependence, and abrupt withdrawal after prolonged use is not followed by an abstinence syndrome. In the amounts taken by addicts in the United States, however, cocaine can cause a dangerous psychosis, and taken chronically it causes tachycardia, insomnia, and anorexia with resultant impairment of nutrition. Cocaine does produce strong psychic dependence, and its prolonged use is undoubtedly detrimental, hence its control by the narcotics laws. Similarly, marihuana does not produce physical dependence manifested by a withdrawal syndrome. Here, too, control is exercised because of the harmful effects of the drug under conditions of abuse.

In recent years the Addiction Research Center of the Public Health Service Hospital at Lexington, Ky., has been investigating the possibility of development of physical dependence during prolonged administration of barbiturates, meprobamate, and similar drugs. It has been shown conclusively that physical dependence could develop when large doses of these substances were taken chronically and that a characteristic abstinence syndrome followed abrupt withdrawal (9-11). It was also shown, however, that no clinically significant degree of dependence developed in persons taking only 0.4 gram or less daily of secobarbital or pentobarbital, that is, two to four times the usual daily oral dosage (12). It is clear from the work at Lexington that the symptomatology of abstinence with barbiturates or meprobamate is distinctly different from abrupt withdrawal of an opiate. Further, physical dependence or addiction with barbiturates and meprobamate has been observed in clinical practice (13-15).

It should be clear that addiction and its relation to narcotics control are complex qualitatively and quantitatively and that our present system of control is not realistically adjusted to this complexity. The Opiates Act says, for example, that the criterion for control

of a new substance shall be ability to produce or sustain an addiction similar to that of morphine or cocaine. If, in this connection, the word similar is interpreted as implying quantitative similarity, difficulty must be encountered in bringing under control a substance of low addiction liability, substantially less than that of codeine, as has been the case with propoxyphene, a weak synthetic analgesic of the methadone group. This particular situation might be clarified by making the criterion for control "qualitatively similar to morphine," leaving to the judgment and experience of the responsible authority whether or not the addiction liability of a particular substance is sufficient in degree to constitute a risk to public health and thus warrants narcotics control. It is possible that control at the manufacturing and wholesale level only would be adequate for substances of low addiction liability where the risk to public health is small, leaving retail trade in drugs of minor addictive potential free of narcotics control, not requiring narcotics prescriptions, narcotics records, and the like.

It has been pointed out that our narcotics laws and regulations, while providing for exempt preparations of codeine and other substances derived from morphine and even for preparations containing up to a certain concentration of morphine itself, make no provision for exempt preparations of synthetic analgesics. Since it is known that the "natural" alkaloids, morphine and substances derived from it, and the synthetic analgesics vary in addictiveness and therefore in risk to public health, both the "natural" and synthetic classes of drugs should be treated in the same way. If exempt preparations are safe and permissible in the "natural" class, they should be safe and permissible in the synthetic class. On the other hand, if the argument is that there is some risk in exempt preparations of morphine and opium because of the possibility of abuse by the consumption of multiple doses, a similar risk would be expected with exempt preparations of synthetic substances with morphine-like addiction liability. The Expert Committee on Addiction-Producing Drugs of the World Health Organization has pointed out repeatedly the risk of

of widespread abuse. The picture changed with the discovery and introduction into medicine of the first synthetic morphine-like pain-relieving drug (pethidine, meperidine, Demerol), the tremendous impetus to research on analgesics which followed that discovery, and the important advances which have been made in the study of addiction. It would seem desirable to consider how the picture has changed and to try to understand the implications of the change.

Pethidine was but the first of a very large number of substances prepared entirely by synthesis in the laboratory which exhibited in animals and man wide differences in analgesic and physical dependence properties. These substances also are widely different in chemical structure. Some are built upon moieties of the morphine molecule. Others differ so greatly in chemical structure that the tentative relationships of structure and analgesic action described by Braenden, Eddy, and Halbach (6) as recently as 1955 cannot always be discerned.

It is well recognized from clinical experience and direct evaluation experiments under controlled conditions that substances derived from morphine differ in analgesic potency and addiction liability and present different degrees of risk to public health, ranging from the great danger of heroin, the main drug in the present-day illicit traffic in the United States, to relatively low risk with codeine, which with proper therapeutic use rarely results in addiction.

Examples of all the synthetic chemical types have been evaluated for addiction liability as well as for analgesic effect and have exhibited a range of activity from much greater than morphine to substantially less than codeine. In this connection the expert committee (7) has stated "that synthetic analgesic drugs differ from one another in addiction liability just as do drugs derived from natural sources such as opium; that members of each class must be considered individually with respect to inherent risk and therapeutic advantage; and that the risk of addiction through the use of synthetic drugs is neither greater nor less than the risk encountered through the use of morphine, related opium alkaloids, or substances derived therefrom."

For the natural alkaloids, that is, for sub-

stances which are modifications of morphine whether occurring in opium or produced in the laboratory, the 1931 convention recognized a difference and established groups I and II for which control regimens would be different. Group I was further subdivided into subgroup (a) comprising morphine and similarly addicting substances, and subgroup (b) comprising ecgonine, thebaine, and other drugs regarded as not themselves addicting but convertible into drugs capable of producing addiction. Group II was established to include codeine, dionin, and related substances, likewise then regarded by many as not capable of producing addiction but also convertible into addiction-producing drugs. The distinction was drawn between subgroup (b) and group II not on theoretical but on practical grounds, namely, that the drugs in group II were very extensively used in medicine all over the world, whereas those in subgroup (b) were hardly used at all by the medical profession (8). All measures of control were applicable to all drugs in group I (both subgroups), but a somewhat modified control was permitted for the drugs of group II. For the latter the substances themselves were controlled internationally in essentially the same way as those in group I with only minor modifications such as greater leeway in estimates of needs and other statistical matters. However, under the convention, compounds of the drugs in group II, if they were adapted to normal therapeutic use, were exempted from international narcotics control.

The U.S. laws do not recognize a distinction in the regimen of control such as that between group I and group II of the 1931 convention except insofar as specifically described preparations of not greater than specified concentration may be sold as conditionally exempt preparations without a narcotics prescription. These limited exemptions were authorized before the discovery of pethidine and the many other synthetics, and the Opiates Act of 1946 made no provision for their extension to a preparation of any synthetic. This situation must be discouraging to pharmaceutical manufacturers and may act as a deterrent to research programs designed to develop analgesics of low addictiveness. Since under present

a drug (natural or synthetic). Three qualitatively different types may be recognized, the characteristics of which are:

Opiate addiction, of which morphine addiction is the prototype, has three major components: tolerance, physical dependence, and emotional (psychic or psychological) dependence. Tolerance, the need for an increasing dose to produce an effect, is an inevitable accompaniment of opiate addiction but does not develop equally to all effects nor necessarily parallel to physical dependence. Physical dependence is an altered physiological state which requires continued administration of a drug to prevent the appearance of a characteristic illness, termed an abstinence syndrome. Emotional dependence is substitution of the use of the drug for other adaptive behavior, the use of the drug becoming the answer to all of life's problems. The abstinence syndrome is a self-limited illness, beginning with yawning, perspiration, rhinorrhea, and lacrimation, progressing to dilatation of the pupil, waves of gooseflesh, twitching of various muscle groups, hot and cold flashes, and restlessness which may become extreme. There is elevation of systolic blood pressure, respiratory rate, and rectal temperature. Retching, vomiting, and diarrhea ensue in the more severe syndromes. There is complete or almost complete anorexia and rapid loss of weight. The time course varies: it may appear in 2 to 4 hours after the last dose of drug and run its course in not much more than 48 hours; it may be delayed in onset for as much as 48 hours and persist for at least 14 days. The abstinence syndrome is precipitable in whole or in part when physical dependence is present by the administration of an opiate antagonist (nalorphine). Opiate addiction is always associated with a drive or compulsion to continue taking the drug and to obtain it by any means.

Cocaine addiction has as its chief characteristic emotional (psychic or psychological) dependence. Tolerance does not develop, there is no physical dependence, and consequently no abstinence syndrome follows withdrawal of the drug. There may be a drive or compulsion to continue taking the drug, depending upon the degree of psychic dependence. In some areas cocaine abuse is a periodic indulgence progress-

ing to a toxic psychosis, characterized by paranoid delusions.

Marihuana (cannabis), like cocaine, produces emotional (psychic or psychological) dependence only. Physical dependence does not develop and there is no abstinence syndrome. Also little, if any, tolerance develops. Abuse is often sporadic, consisting of a periodic intoxication characterized by elation and distortion of time and space perception.

The amphetamines (benzedrine, *d*-amphetamine) also produce only emotional dependence. There is no physical dependence, no abstinence syndrome, and very little tolerance. Chronic intoxication resulting from abuse resembles in symptomatology chronic intoxication with cocaine.

Barbiturate addiction is characterized by emotional (psychic or psychological) dependence, physical dependence, and partial tolerance, but it implies habitual consumption of amounts far in excess of usual therapeutic doses. While barbiturate addiction has the same three components as opiate addiction, there are two significant differences. First, with the opiates there is evidence to indicate that physical dependence may begin to develop with the first dose; with the barbiturates there is no evidence that significant physical dependence occurs in patients who consume only usual therapeutic doses. Second, the abstinence syndromes with the opiates and with the barbiturates are characteristically different. The barbiturate abstinence syndrome is characterized by anxiety, nervousness, disturbances of cardiovascular responses, twitching of muscle groups, and tremor progressing to convulsions of petit mal or grand mal type and confusion or both, disorientation, and hallucinations predominantly visual. The abstinence syndrome, as with the opiates, is self-limited. Some degree of compulsion to continue taking the drug will occur in barbiturate addiction.

Meprobamate, as well as other hypnotics, may produce an addiction with the same characteristics as the barbiturates.

Non-Opiates and Narcotics Control

The consensus today, nationally and repeatedly affirmed by the Expert Committee on Ad-

addiction through the use of multiple doses of preparations of strongly addicting substances (16, 17) and that admixture with other substances cannot be relied upon to avoid such risk (18).

In contradistinction to what has just been said about exempt preparations of morphine, of opium, and of synthetics with comparable addiction liability, a very desirable measure of flexibility in narcotics control would be provided by extension of the exempt preparation provisions to substances of low addiction liability, irrespective of origin. Provided such a modification does not contravene any international agreement, the substances in pure form would be subjected to narcotics control, but preparations or combinations of them, in mixtures with other therapeutic non-narcotic agents from which the addicting substance would not be readily recoverable, would be exempt from narcotics control.

Our national laws make no provision for control of a substance not itself addicting but readily convertible into another substance known to be addicting. This lack could lead to grave danger, allowing free trade in the parent substance and giving opportunity for clandestine transformation into the addicting agent. It would seem desirable to control the convertible substance as one would control any substance into which it can be converted.

The categories of control now provided by law or suggested herein for a realistic relationship between degree of narcotics control and risk to public health then should include: full control for substances having high or intermediate addiction liability; the oral prescription list of substances or mixtures having little addiction liability; exempt status for preparations and mixtures of safe concentration from the standpoint of abuse; and control at the manufacturing and wholesale level only for substances with very low addiction liability. In addition, there would be advantage in an official listing of certain compounds to which no narcotics control is presently applied. This listing would include substances related to those under some degree of narcotics control or other substances with clinical usefulness which, because of their general chemical or

pharmacological characteristics, might be considered to have addiction potentiality, but concerning which there is no conclusive evidence of such liability. The listing would make interested parties aware that the status of such compounds would be reviewed from time to time as experience accumulated so that if evidence of addiction or other abuse appeared the proper degree of control would be applied.

To maintain the flexibility of narcotics control and to keep the degree of control applied to all drugs commensurate with the degree of risk to public health, the authority designated by law to make a finding in this field should be empowered to revise such a finding in the direction of either greater or less control, including complete removal of a substance from narcotics control, when experience warrants such revision. The designated authority too should have for its guidance adequately representative technical advice and, before a finding is made, recommendations of that advisory body should be published and an opportunity provided for a hearing and presentation of additional or counter evidence by any interested party, as in the 1946 Opiates Act procedure. Also it is to be understood that any revision of national control with respect to a particular substance must be consistent with our obligations under international agreements.

Addiction Redefined

Two general criteria for narcotics control are available, "addiction-producing and addiction-sustaining similar (or qualitatively similar) to morphine," as in our 1946 Opiates Act; or "liable to the same kind of abuse and productive of the same kind of harmful effects," as in the 1948 protocol. With either would it not be well to substitute for the heterogeneous, albeit comprehensive, definition of addiction of the World Health Organization's expert committee, a definition which would be specifically descriptive of the various qualitative types of addiction already alluded to? The following text is suggested:

For an understanding of the need and scope of narcotics control, drug addiction may be defined as a state of periodic or chronic intoxication produced by the repeated consumption of

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- (17) World Health Organization, Expert Committee on Addiction-Producing Drugs: Ninth report. Technical Report Series No. 160. Geneva, 1959, p. 7.
- (18) World Health Organization, Expert Committee on Drugs Liable to Produce Addiction. Fifth report. Technical Report Series No. 95. Geneva, March 1955, p. 8.

Training in Epidemiology

A course in applied epidemiology will be offered at the Rocky Mountain Field Training Station of the Communicable Disease Center, Public Health Service, in Denver, Colo., November 16-20, 1959.

Designed primarily for physicians who investigate disease outbreaks or who have administrative responsibility for such investigations, this course serves as a review for experienced health administrators and as a guide to physicians new to public health.

Emphasis is placed on developing an understanding of the use of epidemiological techniques to solve problems pertaining to preventable diseases. Lecture-discussion sessions and audiovisual aids are used in the presentations. Group participation is stressed through group solution of epidemiological problems, seminars, and panel discussions. Registrants will be expected to attend all sessions of the course.

Further information and application forms may be obtained from: Chief, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga., Attention: Chief, Training Branch; or from: Public Health Service, Region VIII, First National Bank Building, Denver 2, Colo.

diction-Producing Drugs of the World Health Organization, is that, although abuse occurs, narcotics control should not be extended to the amphetamines, the barbiturates, or other sedatives. There are several reasons for this opinion.

Clinical experience leads us to believe that most persons will handle and use these drugs as prescribed and will not develop a chronic intoxication or addiction. This is not believed to be true of the opiates, cocaine, or marihuana. Cocaine and opium are derived from plants whose production is limited to certain areas of the world from which they are transported to processing and consuming countries. International control is absolutely necessary. Amphetamines, barbiturates, and other hypnotics are produced primarily by local manufacturers, making control of imports and exports less of a problem and control of these drugs by local measures effective. Furthermore, indications for the medical use of the amphetamines or of the hypnotics are more numerous and far broader than indications for the opiates, cocaine, or marihuana. The barbiturates are widely used in the treatment of epilepsy, peptic ulcer, hypertension, mild neuroses, and simple insomnia. Meprobamate is finding wide application in mental disease. The amphetamines are used medically as anorexic agents, for the treatment of narcolepsy, to elevate mood in depressed individuals, to elevate blood pressure in shock, and in many other situations.

On the other hand, the main indication for use of opiates is the presence of severe pain; the use of cocaine is practically limited to local anesthesia; and marihuana has no medical indication. To place the restrictive regulations of narcotic laws on the amphetamines, the barbiturates, and other sedatives would hamper proper medical use and would not be justified in view of the relatively low public health risk which is already mitigated through regulations in respect to these drugs in the food and drug statutes, both Federal and State.

Conclusions

It is concluded that implementation of suggestions made in the discussion with respect to changes in our national narcotics control regimen would:

1. Remove any distinction between substances of natural or purely synthetic origin with respect to the possibility of exempt preparations.
2. Provide flexibility of narcotics control based upon the degree of risk involved, varying from full control for substances of high addiction liability to control at the manufacturing and wholesale level only for substances of low addiction liability. Alternatively for the latter group, control of the pure substance and exemption from control of its preparations with other therapeutic agents might be provided.
3. Bring local regulations into line with the international narcotics conventions.
4. Encourage the development of much needed analgesics of an efficacy more or less comparable to codeine which might have low addiction liability by making possible a commensurate degree of narcotics control.
5. Clarify the meaning of addiction in relation to narcotics control, by descriptive definition and by basing the application of control to new substances upon properties qualitatively similar to those of morphine.

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the period 1952 through 1958. The next phase will be concerned primarily with the development and testing of methods for conducting a national epidemiological study of the disease.

The hospital survey was undertaken first not only because the need for hospital care is an important aspect of the health problem presented by this disease, but also because information about hospitalized patients is more readily available than any other data on prevalence since most hospitals maintain an index of diseases which makes possible the identification of cystic fibrosis patients. It is generally believed, however, that the number of hospitalized patients is only a fraction of the total number of children with the disease.

Method

The survey covered all hospitals in the continental United States listed in the American Hospital Association and the American Osteopathic Hospital Association directories for 1958, except psychiatric institutions. A stratified sample of about 9 percent, or 616, of the 6,723 listed nonpsychiatric hospitals was selected. All 296 hospitals approved for pediatric residency were taken. A sample of other hospitals was selected with probability roughly proportionate to the number of hospital beds. The sampling rates ranged between 2 and 100 percent for the hospitals with the smallest and largest numbers of beds, respectively (table 1).

Questionnaires were sent by regular mail to the sample hospitals. Hospitals that did not return them within 2 weeks were sent a follow-up letter by certified mail. Toward the end of the fourth week of the survey, telephone calls were made to the larger hospitals with pediatric residencies that had not responded. Returned questionnaires were edited for completeness and consistency, and special letters were sent to hospitals that reported incomplete or inconsistent information. The survey lasted 5 weeks, from January 8 through February 13, 1959.

Interpretation of Data

The questionnaire requested information on the number of different patients discharged with a diagnosis of cystic fibrosis, the number of dis-

charges for these patients, and the number of discharges that were due to death. Separate information was requested for each calendar year during the 7-year period 1952-58. Because cystic fibrosis (indexed under fibrocystic disease of the pancreas) was listed for the first time in the fourth edition of the American Medical Association's Standard Nomenclature of Diseases and Operations, published in 1952 (6), that year was chosen as the beginning of the study period. The standard nomenclature is the basis for disease indexing in the vast majority of hospitals in the United States. Additional information relating to the characteristics of the discharges for 1957 was also requested, but these data are not considered in this report. The final section of the form requested information about the type and currency of diagnostic indexing, which was useful in evaluating the quality of the reported data.

Evaluation of the quality of the data reported by the hospitals for the 6-year period 1952-57, shown in table 2, was based entirely on the completeness and consistency of the data on the returned form. Data for 1958 were excluded because a substantial number of hospitals had not yet completed their diagnostic indexing for that year. According to the evaluation criteria, about 80 percent of the hospitals reported complete and consistent information for the entire 6-year period. By the cutoff date no data were reported for almost 10 percent of the hospitals:

Table 1. Sampling strata of the national hospital survey of cystic fibrosis

Type and size of hospital	Sampling rate (percent)	Number of listed hospitals	Sample size
All hospitals in AHA and AOHA directories (psychiatric institutions excluded).....	9.16	6,723	616
Hospitals with pediatric residencies.....	100.00	296	296
Other hospitals.....	4.98	6,427	320
1,000 or more beds.....	100.00	37	37
300-999 beds.....	20.00	425	85
200-299 beds.....	10.00	508	51
100-199 beds.....	5.00	1,197	61
Less than 100 beds.....	2.00	4,260	86

A substantial number of hospitalized cases of cystic fibrosis with a relatively high fatality rate indicates one aspect of the health problem presented by this disease, first differentiated only some 20 years ago.

A National Hospital Survey of Cystic Fibrosis

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and ELIZABETH R. KRAMM, Ph.D.

CYSTIC FIBROSIS, also known as fibrocystic disease of the pancreas and as mucoviscidosis, has been increasingly recognized during recent years as one of the major diseases of childhood. As recently as 1938, Andersen (1) differentiated the disease from other superficially similar conditions. It is known to be a familial disease involving malfunction of various exocrine glands, but the basic defect underlying its pathological manifestations is not yet understood.

Clinically, cystic fibrosis is most often evidenced by chronic digestive and respiratory disturbances appearing usually in infancy or early childhood. Without treatment these generally progress to nutritional failure or severe respiratory involvement, or both, and to death before school age. Other manifestations include intestinal obstruction in the newborn, heat prostration, and, more rarely, cirrhosis of the liver. Cure is not possible, but with the use of recently

developed methods of diagnosis and treatment prognosis has become more hopeful. When the disease is recognized in its early stages or in milder forms, development of serious symptoms can often be prevented. Antibiotics help to control the susceptibility to respiratory infection, but once pulmonary lesions are established they tend to persist and can be fatal or seriously handicapping.

The frequency of the disease in the general population is not known, but it appears to be high. On the basis of a small survey of hospitals and pediatricians, it was estimated that during the period 1945-49 the disease occurred 7 to 10 times per 10,000 live births (2). The condition has been found in about 3 percent of the autopsies performed in children's hospitals (3). Early clinical experience with the disease indicated that death occurs in infancy or early childhood for a majority of positively diagnosed cases (4). Recently, however, survival beyond childhood of patients with cystic fibrosis has been noted with increasing frequency (5).

The Children's Bureau and the National Office of Vital Statistics are cooperating in a project designed to obtain information on the magnitude and characteristics of the health problem presented by cystic fibrosis. In the first phase of the study, reported here, data have been obtained by a mail survey on the number of children with a diagnosis of cystic fibrosis who were cared for in hospitals during

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Table 4. Estimated number of patients, discharges, and deaths with a diagnosis of cystic fibrosis reported by hospitals, United States, 1957

Type of hospital	Patients	Discharges	Deaths
All hospitals-----	2, 525	3, 229	359
Hospitals approved for pediatric residency---	1, 186	1, 544	237
Other hospitals-----	1, 339	1, 685	122

rience was the same as that reported by hospitals included. The adjusted frequencies were subsequently inflated by the inverse of the sampling rate to obtain the national estimates presented in this report. The adjustment and inflation of the tabulated frequencies were made independently for each sampling stratum. Data for two hospitals which specialized in research on cystic fibrosis and which reported the highest caseloads were excluded prior to adjusting the estimates for nonreporting hospitals approved for pediatric residency. The trend figures for 1952-57 were based on hospitals providing complete and consistent information for the 6-year period, and the frequencies were adjusted and inflated as for the 1957 data.

A qualifying statement is necessary regarding the estimates of the number of cystic fibrosis patients presented in this report. The hospitals were requested to report the number of different patients who were discharged each year. No attempt was made, however, to obtain identifying data on individual cases such as would be needed to eliminate duplicate re-

porting of cases from year to year within the same hospitals or from different hospitals within the same year.

Since the survey was conducted with a sample of hospitals, the estimates presented in this report are subject to sampling errors. The approximate sampling errors in the estimates of patients, discharges, and deaths for 1957 are shown below. The chances are about 19 out of 20 that differences due to sampling variability between the estimate based on the sample of hospitals and the figure that would have been obtained from a survey of all hospitals is less than twice the sampling error. The sampling errors of the estimates for other years were roughly the same as those for 1957.

Type of hospital	Percent sampling error		
	Patients	Discharges	Deaths
All hospitals-----	10	10	10
Hospitals not approved for pediatric residency-----	20	20	30

Estimates for 1957

About 2,500 patients with a diagnosis of cystic fibrosis were discharged from hospitals in the United States during 1957 (table 4). This estimate is probably somewhat higher than the true figure because patients discharged with this diagnosis from more than one hospital during 1957 were counted by each hospital. Approximately 95 percent of the 2,500 patients were under 20 years of age. For these 2,500 patients, about 3,200 discharges were reported, indicating multiple discharges from the same hospital during 1957 for many of them. About 360 hospital deaths were attributed to cystic fibrosis, or ap-

Table 5. Trend in the estimated number of patients, discharges, and deaths with a diagnosis of cystic fibrosis, by type of hospital, United States, 1952-57

Year	All hospitals			Pediatric residency hospitals		
	Patients	Discharges	Deaths	Patients	Discharges	Deaths
1957-----	2, 525	3, 229	359	1, 186	1, 544	237
1956-----	2, 611	3, 375	451	1, 210	1, 586	237
1955-----	2, 112	2, 638	475	1, 170	1, 490	248
1954-----	2, 379	2, 981	387	1, 127	1, 425	205
1953-----	1, 900	2, 309	371	1, 101	1, 487	234
1952-----	1, 687	2, 107	295	981	1, 259	198

Table 2. Evaluation of hospital reporting in national survey of cystic fibrosis for period 1952-57, by type and size of hospital

Type and size of hospital	Sample size	Percent of sample				
		Complete and consistent data for full period	Complete and consistent data for part of period	No data		
				Total	Non-response	Other reasons
All hospitals in AHA and AOHA directories (psychiatric institutions excluded).....	616	79.5	11.0	9.4	7.0	2.4
Hospitals with pediatric residencies.....	296	79.1	10.8	10.1	7.1	3.0
Other hospitals.....	320	80.0	11.3	8.8	6.9	1.9
1,000 or more beds.....	37	83.8	10.8	5.4	2.7	2.7
300-999 beds.....	85	84.7	8.2	7.1	5.9	1.2
200-299 beds.....	51	66.7	19.6	13.7	9.8	3.9
100-199 beds.....	61	88.5	8.2	3.3	3.3	0
Less than 100 beds.....	86	75.6	11.6	12.8	10.5	2.3

7 percent did not respond and 2.4 percent indicated inability to comply with the request for data within the specified time. (About one-fourth of the nonresponding hospitals replied within 1 month after the cutoff date but too late to be included in this analysis.) Another 11 percent of the hospitals returned forms which were evaluated as incomplete or inconsistent for 1 or more years between 1952 and 1957.

One exception was made in evaluating the returned forms. A large pediatric residency hospital provided annual data for the number of patients discharged and the number of deaths but could not provide information on the total number of discharges within the time limits. Discharges were estimated by assuming

a ratio between discharges and patients based on data reported by another large pediatric residency hospital.

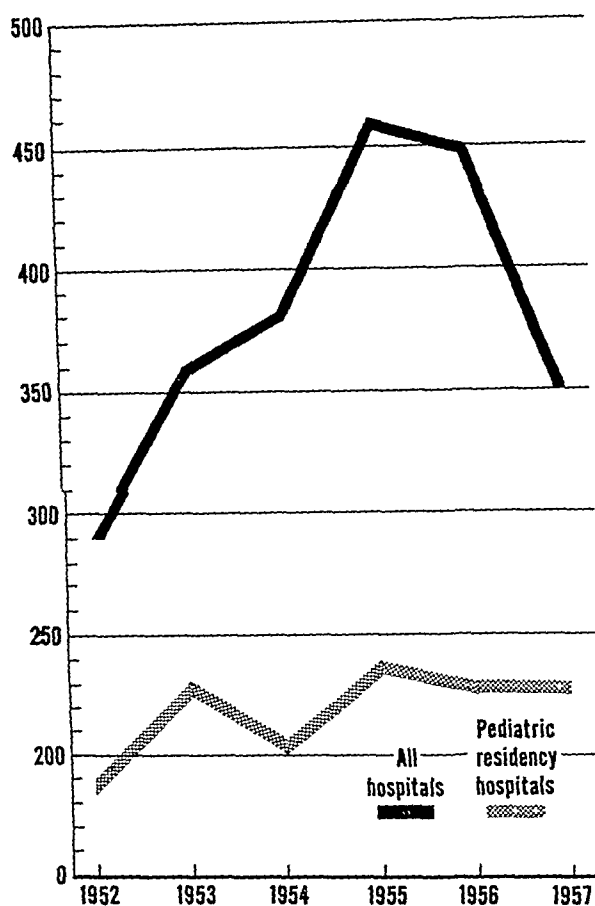
As might have been expected, the reported hospital data were more complete and consistent for the more recent years. About 89 percent of the hospitals reported complete and consistent information for 1957 as compared with 82 percent for 1952 (table 3).

Tabulations of reported frequencies of patients, discharges, and deaths during 1957 were based solely on hospitals providing complete and consistent information for that year. The tabulated frequencies were appropriately adjusted for the hospitals excluded from the tabulations under the assumption that their expe-

Table 3. Percentage of hospitals reporting complete and consistent data on patients, deaths, and discharges with a diagnosis of cystic fibrosis, by type and size of hospital, 1952-57

Type and size of hospital	Sample size	1957	1956	1955	1954	1953	1952
All hospitals in the AHA and AOHA directories (psychiatric institutions excluded).....	616	89	88	87	85	84	82
Hospitals with pediatric residencies.....	296	88	86	87	85	84	82
Other hospitals.....	320	90	89	88	85	83	82
1,000 or more beds.....	37	97	97	95	95	89	87
300-999 beds.....	85	91	91	89	87	86	85
200-299 beds.....	51	84	84	82	77	75	71
100-199 beds.....	61	93	95	95	92	92	92
Less than 100 beds.....	86	86	81	80	79	78	77

Figure 2. Trend in the number of deaths attributed to cystic fibrosis in hospitals, United States, 1952-57



centers. Greater awareness on the part of physicians and improved diagnostic techniques have resulted in earlier recognition of the milder forms of the disease, many of which do not require hospitalization. The cystic fibrosis patients hospitalized in 1957, therefore, probably represented a smaller proportion of the total number of cases known to physicians than did the patients hospitalized in 1952, even though the number of persons hospitalized for the disease had increased 50 percent from 1952 to 1957.

Data are yet to be obtained on the ratio of persons hospitalized with cystic fibrosis to total persons with the disease. There are diagnosed cases which have not been admitted to a hospital as well as undiagnosed cases. Concerning the former, Dr. Harry Shwachman of the Children's Medical Center in Boston, a center long

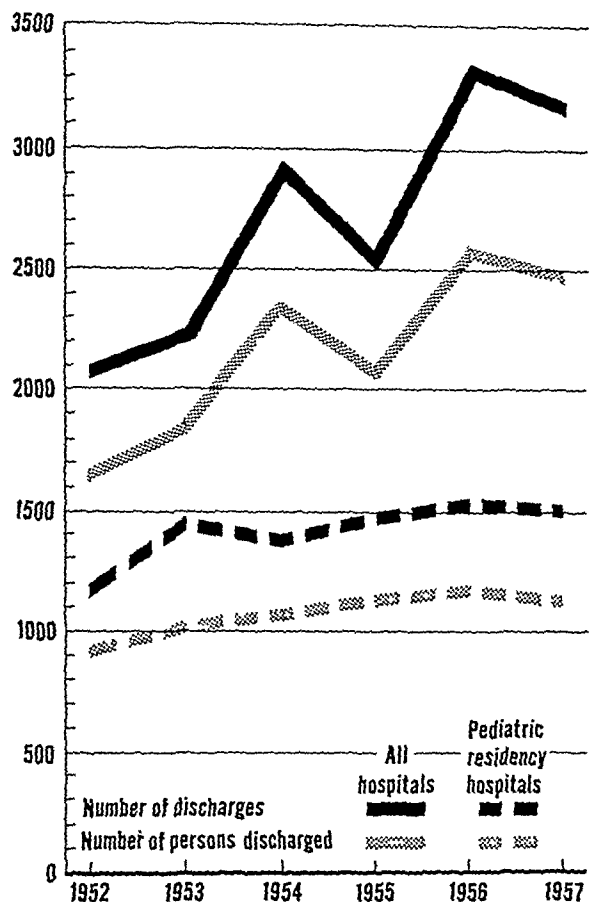
known for its interest in cystic fibrosis, has estimated that of the 500 children with this condition followed in his office or clinic practice, at least 25 percent have never been hospitalized. Dr. Gordon E. Gibbs in the department of pediatrics of the University of Nebraska has stated that of 40 children with cystic fibrosis directly or indirectly under his care only 4 have ever been admitted to a hospital. It seems likely that the 2,500 cystic fibrosis patients discharged from hospitals in the year 1957 represent only a small part of the total number of patients with the disease, although the exact proportion is still uncertain.

That the number of hospital discharges with a diagnosis of cystic fibrosis is nearly a third greater than the number of persons so discharged in the same year indicates that many of the patients are so ill as to need repeated hospital admissions within a short period. On the basis of an estimated 2,800,000 hospital discharges for patients under 15 years of age from July 1957 through June 1958 (7), cystic fibrosis was the diagnosis of roughly 1 in every 1,000 hospital discharges among children.

The estimate of the number of annual hospital deaths attributed to cystic fibrosis obtained from this survey is supported by information from another source. The National Office of Vital Statistics has obtained an estimate of the number of deaths attributed to cystic fibrosis by coding the disease separately in its analysis of a 10 percent sample of 1958 death certificates. Such data have not been obtained nationally in previous analyses of death certificates because cystic fibrosis has hitherto been included in the residual category "Other diseases of pancreas."

Analysis of the sample of 1958 death certificates revealed an estimated 560 deaths in the United States attributed to cystic fibrosis in that year. Of these, about 400 occurred in hospitals. With due regard to sampling error, this is consistent with the finding from the hospital survey of an estimated 359 hospital deaths attributed to cystic fibrosis in 1957. The finding that about 160 (over one-fourth) of the cystic fibrosis deaths reported on 1958 death certificates occurred outside hospitals is evidence that the children are not always hospitalized even during the most acute phases of the illness.

Figure 1. Trend in the number of patients and discharges with a diagnosis of cystic fibrosis from hospitals, United States, 1952-57



proximately 1 out of every 7 patients with the diagnosis.

Although hospitals with pediatric residencies represented less than 5 percent of all hospitals, they accounted for almost 50 percent of the patients and discharges and almost 65 percent of the deaths (table 4). The two children's hospitals, Babies Hospital in New York City and Children's Medical Center in Boston, in which physicians have for a long time had special interest in this disease, accounted for about 6 percent of the patients and discharges and 7 percent of the deaths reported for 1957.

Trends for 1952-57

The annual number of patients with cystic fibrosis increased by about 50 percent during the 6-year period 1952-57, or from about 1,700

to about 2,500 (table 5, fig. 1). During the same period the population under 20 years of age, which included virtually all the diagnosed cases of cystic fibrosis, increased only between 15 and 20 percent. Most of the increase in cystic fibrosis patients occurred in hospitals not approved for pediatric residency, the number in pediatric residency hospitals remaining relatively constant during the entire period.

The number of discharges also increased by about 50 percent, or from 2,100 in 1952 to about 3,200 in 1957, and again most of the increase occurred in nonpediatric hospitals (table 5, fig. 1).

The number of hospital deaths attributed to cystic fibrosis reached a peak during 1955 and then declined in 1957 (table 5, fig. 2). During the 6-year period, the proportion of deaths ranged between 14 and 25 percent of the total number of patients discharged with the disease. It is difficult, however, to draw conclusions about the death trend from these data since most of the annual changes in the number of deaths in hospitals may reflect sampling variability.

Discussion

This survey has provided data on the number of patients with a diagnosis of cystic fibrosis discharged from hospitals in the United States for each of the 6 years from 1952 through 1957. However, the numbers for individual years cannot be added together to obtain a total for the period since the same persons could have been reported for 2 or more years. Even within a single year there could have been duplicate reporting for patients discharged from more than one hospital during that year.

In the years covered by the survey there has been a continuous and substantial increase in the annual number of patients hospitalized with a diagnosis of cystic fibrosis. Since this increase is about three times greater than the increase in the size of the population under 20 years of age, it is only partially explained by this factor. The increase may be interpreted as indicating greater success in recognizing the disease. Most of the increase is reported from hospitals that do not have a pediatric residency and is probably the result of an increased awareness of the disease outside pediatric

A pilot program in Bolivia demonstrates the feasibility of smallpox eradication by mass vaccination at the sources of the disease.

Smallpox Eradication

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NATIONS freed of smallpox are confronted by a continuous threat of reinvasion from the endemic foci remaining in the world. The concept of control, limited to the protection of a national population and resigned to the existence of endemic foci in other nations, requires a perpetual and elaborate system of defense: education, general vaccination in infancy, routine revaccination, reporting, isolation, disinfection, quarantine, investigation, contact vaccination, general revaccination, international notification, certification, and medical inspection. However, the frequent movement of the disease across international boundaries shows that, even with elaborate control measures, no nation can permanently prevent reinfection.

Dr. Frederiksen, who is now program officer, Division of International Health, Public Health Service, served in 1957 and 1958 as director of the Servicio Cooperativo Interamericano de Salud Pública, a joint agency of the Republic of Bolivia and the United States. Dr. Torres Muñoz was associate director of the agency, and Dr. Jauregui Molina, director of SCISP's vaccination service.

Only the eradication of smallpox would end the threat of the disease, as well as the otherwise unending efforts and costs of control. What are the prospects for eradication once all nations join in an unrelenting attack on smallpox wherever transmission persists?

Rather than evaluate hypothetical obstacles to eradication it seems appropriate to cite the circumstances, methods, and results of the pilot program in Bolivia undertaken by the Servicio Cooperativo Interamericano de Salud Pública. With one of the highest attack rates for smallpox, Bolivia was one of the principal endemic foci in the American Hemisphere (1). Because of a unique combination of adverse factors, Bolivia was a testing ground for the feasibility of smallpox eradication through the progressive elimination of the endemic foci remaining in the world.

The Setting

Landlocked in the heart of the South American continent, Bolivia has climate and scenery that range from steaming tropical to Alpine. Most of its 1 million square kilometers is tropi-

Estimates of 1958 deaths by cause for the population under 15 years indicate that cystic fibrosis ranked higher as a cause of death than such other diseases as diabetes, rheumatic fever, and poliomyelitis. Cystic fibrosis is comparable to these diseases not only as a cause of death but also in the lasting and handicapping disability it often causes in patients who survive.

Summary

A nationwide hospital sample survey, conducted between January 8 and February 13, 1959, obtained information about hospital patients discharged with cystic fibrosis. The survey provided the following national estimates:

1. In 1957, about 2,500 patients were discharged from hospitals with a diagnosis of cystic fibrosis. Of these, 95 percent were under 20 years of age. The total number of discharges for that year was approximately 3,200, indicating repeated hospitalization for many of the patients. About 360, or 14 percent of the patients, were discharged by death. (A sample of 1958 death certificates indicated that roughly one-fourth of all deaths due to cystic fibrosis occur outside hospitals.)

2. From 1952 to 1957, the number of hospitalized patients with the disease increased by approximately 50 percent. There was a corresponding increase in the total number of discharges. Most of the increase in the number of patients and discharges occurred in hospitals other than those approved for pediatric residency. The estimated number of deaths in 1957 was approximately 20 percent greater than the estimate for 1952, but this difference

may be attributed to sampling error. During the intervening years, a somewhat higher number of deaths was reported.

Although estimates of the number of patients discharged from hospitals with a diagnosis of cystic fibrosis are probably far short of the prevalence of the disease in the general population, the fact that in 1 year 2,500 persons were hospitalized and that 1 out of every 6 or 7 was discharged by death affords a striking picture of the seriousness of this disease.

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Table 2. Correlation between population density and the prevalence of pockmarked persons by age groups in five provinces of the highland plateau of Bolivia, 1958

Province	Population density per square kilometer	Age group (years)																			
		0-4				5-9				10-19				20-29				40 and over			
		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked						
			Number	Per-cent		Number	Per-cent		Number	Per-cent		Number	Per-cent		Number	Per-cent					
Manco																					
Kapac----	60.3	20	1	5	47	4	8.5	46	10	21.7	36	18	50	30	23	76.6					
Camacho----	32.5	252	4	1.6	282	30	10.6	344	81	23.5	449	206	45.9	310	173	55.8					
Omasuyos----	31.4	171	1	0.6	245	17	6.9	196	33	16.8	218	81	37.1	167	82	49.1					
Los Andes----	30.9	231	1	0.4	300	8	2.6	408	21	5.1	363	89	24.5	223	103	46.1					
Ingavi-----	12.2	222	0	0	254	7	2.7	401	24	5.9	360	101	28	147	57	38.7					

climate revealed that only 37.6 percent of those vaccinated within the past 10 years were immune, and of those vaccinated 10-40 years previously, only 3 percent were immune. The low percentages cannot solely be attributed to a loss of immunity and lack of revaccination.

The prevalence of pockmarked persons by age groups and department gives an indication of the previous incidence of smallpox (table 1). It might be recalled that for every three pocked individuals there has been one death from smallpox with the assumption of a fatality rate of 25 percent.

The highest prevalence of pockmarked persons is in the La Paz Department, particularly among those over 40 years of age with 40.9 percent pockmarked. The greatest prevalence of pockmarked individuals in this department may be attributed to the cool dry climate and the relative density of the population and the means of communication, as compared with the remainder of Bolivia.

The correlation of smallpox with cool dry climate is supported by the seasonal peak observed in Bolivia during the dry winter months.

The percentages of pockmarked persons in five provinces of the La Paz Department along the shores of Lake Titicaca, quite identical in respect to topographic, climatic, socioeconomic, and racial factors, confirm the correlation between population density and the prevalence of pockmarked individuals (table 2).

It is interesting to note that immunity fol-

lowing smallpox, at least to vaccination, is not absolute. In a sample of 434 pockmarked persons over 10 years of age, only 56.5 percent displayed immune reactions. Nevertheless, a second attack in the same individual seems to be a rare occurrence, which is attributed to the longer duration of immunity to smallpox than to vaccination.

The assessment of the consequences of the disease must also include blindness. In Bolivia smallpox ranks as the principal cause of blindness, with more than one-third of the inmates of institutions for the blind dating their history of disability from an attack of smallpox.

The Campaign

Cochabamba, the central department of Bolivia, was the epicenter of an epidemic wave with 87 outbreaks of smallpox reported during 1957. Emergency efforts were undertaken during the latter half of that year. Simultaneously, preparations were made for a nationwide campaign. The preparations included a successful request for a budget of \$125,000 and supporting legislation, importation of equipment and vaccine, development of methods, preparation of a plan of operations, and selection and training of personnel. The emergency efforts to combat the epidemic in Cochabamba, undertaken with personnel and equipment borrowed from other programs, provided a test for the methods and plan of operations.

cal lowland along the cayman-infested, headwaters of the Amazon. The majority of the 3.3 million people of Bolivia live on the highland plateau, the Altiplano, at an elevation of 3,500 meters, where La Paz, the seat of government, is located.

Bolivia is thinly populated, with a density of 3.3 persons per square kilometer. Means of communication are limited. Much of the country is inaccessible by road, and most of the existing roads are unsurfaced and frequently are blocked by floods and landslides. Bolivia is one of the few countries of the world with areas still awaiting exploration.

While ethnic distinctions are blurred, the population can be divided sociologically into a literate minority, largely of Spanish descent, and an illiterate majority of Indian stock. The Indians usually have only a little knowledge of the official language, Spanish.

A number of devastating wars and revolutions have impeded development. The country, while potentially rich, remains undeveloped, and the per capita income is low. The combination of adverse factors has limited health services to a minority.

Past Control Efforts

Data indicated that vaccinations in Bolivia were deficient in quantity and quality. In

115 samples totaling 47,742 persons from the highland plateau, the valleys, and lowlands, the proportion of those previously vaccinated fluctuated between 11.1 percent and 94 percent, with a median of 69.3 percent. While this percentage may seem fairly satisfactory, a closer examination reveals a less reassuring situation. In Sucre, the legal capital, which had one of the highest percentages of previous vaccinations, 93.1 percent, only 32.5 percent were found to be vaccinated in the 0-4 age group. In other provinces fewer persons have been vaccinated during infancy and childhood.

The lack of vaccination during infancy and childhood is reflected by the high proportion of the smallpox deaths which are reported in the 0-4 age group. In a recent sample, 95 of 136 consecutive deaths reported were in this age group.

The low percentage of vaccinations, particularly during early childhood, is complicated by the poor quality of vaccinations in the past, largely attributable to the use of glycerinated vaccine without adequate refrigeration facilities. A potent glycerinated vaccine has been successfully produced and applied in Sucre, but this vaccine has not produced reliable results in other parts of the country, as a result of difficulties in maintaining the potency of the glycerinated vaccine. A sample of 463 individuals from a highland province with a temperate

Table 1. Prevalence of pockmarked persons in Bolivia by age group and department, 1958

Department	Age group (years)														
	0-4			5-9			10-19			20-39			40 and over		
	Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked	
		Number	Percent		Number	Percent		Number	Percent		Number	Percent		Number	Percent
La Paz	1,526	13	0.9	3,279	120	3.7	4,390	292	6.7	2,600	687	26.4	1,500	613	40.9
Oruro	598	1	.2	834	9	1.1	798	25	3.1	792	117	14.8	258	58	22.5
Potosí	907	14	1.5	2,031	41	2.0	1,579	77	4.2	1,086	182	16.8	511	171	31.4
Cochabamba	2,959	60	2.0	3,193	102	3.2	3,134	212	6.8	3,070	406	13.2	2,048	478	23.3
Chuquisaca	759	0	0	1,682	2	.1	1,427	19	1.3	1,144	97	8.5	846	173	20.4
Tarija	128	0	0	156	0	0	229	0	0	184	2	1.1	116	11	9.6
Beni	36	0	0	48	1	2.1	39	1	2.6	48	3	6.3	25	3	12.0
Santa Cruz	1,372	2	.1	1,295	18	1.4	1,612	39	2.4	1,488	110	7.4	828	76	9.2

vaccination with type of take of each person in the samples.

The data of the vaccinators and inspectors were routinely tabulated to provide a variety of information including the number vaccinated by month, province, and vaccinator; average number vaccinated per man-day; percentage vaccinated in the campaign; percentage pockmarked by age group and province; percentage with prior vaccination; and percentage of primary takes by vaccinator and lot of vaccine. In addition, tables and maps were maintained for the cases and deaths reported.

Public Information

In the rural areas advance notification of the day of vaccination was given, and at that time the cooperation of the community leaders was obtained. Prior to and during the vaccinations loudspeakers were employed to arouse and inform the public. Possibly of greatest importance was the personal contact of the vaccinator with the individual at the time of vaccination. Everyone vaccinated was considered a potential health educator who could inform family, friends, and neighbors of the harmless but important procedure.

Additional means of informing the public in urban areas included newspapers, radio, pamphlets, and posters. In epidemic situations in two of the largest cities the public cooperated with a more or less spontaneous boycott of those not vaccinated. When the majority of the population had been vaccinated, permission was obtained from the officials of certain public facilities to announce that no one unvaccinated would receive service, effective the following week. Immediately, bus drivers, elevator operators, and most everyone who had taken the trouble to get vaccinated spontaneously supported the boycott. Instead of creating bad feelings, it led to a new form of salute, the raised little finger. The epidemics were abruptly terminated.

Operations

The operations of the vaccination campaign were outlined in specific itineraries for the vaccinators covering periods of about 25 days, including Sundays and holidays, and followed by commensurate days of compensatory leave

when preparations were made for the next itinerary. The vaccinators received individual assignments of specific areas to facilitate the evaluation of the quantity and quality of work. To maintain discipline and aid morale, whenever possible the teams of four vaccinators were given assignments sufficiently close together to permit them to share eating facilities and billeting.

Vaccinations were performed house to house and, when appropriate, were followed by a vaccination session at a temporary center for those who had been missed in the house-to-house vaccinations. Everyone was vaccinated, regardless of age, sex, or previous history of vaccination and smallpox. Those less than 4 weeks old, the acutely ill, and those with eczema were the only exceptions.

The teams proceeded along the main or secondary roads and the rivers and their branches, reaching on foot population concentrations up to 20 kilometers distant from road or river. In instances of reported outbreaks, the teams rented mules and traveled up to 100 kilometers distance from the roads.

Evaluation and Results

With the vaccination of 2,432,186 persons, about three-fourths of the estimated population of Bolivia, the attack phase of the campaign was completed on schedule by the end of 1958.

In the target areas samples totaling 42,075, widely distributed in time and place, showed 91 percent of the population had been vaccinated. The high percentage vaccinated is attributed to the house-to-house visits, followed by a vaccination session at a temporary center, and the use of loudspeakers to attract the people.

The inspection of primary vaccinations of 3,662 infants in samples, widely distributed in time and place, yielded 96.3 percent primary takes.

An average of 210 vaccinations were performed per man-day, excluding the performance in major cities from the calculation. This high average is attributed to advance planning of itineraries, simplicity of the vaccination technique, and paucity of recording required of the vaccinator, permitting exclusive

Methods first developed and successfully applied in Iran were refined and reapplied in Bolivia (2). The campaign was conducted by the Servicio Cooperativo Interamericano de Salud Pública under the auspices of the Ministry of Public Health of Bolivia and the International Cooperation Administration of the United States.

We hoped that approximately 2.5 million of the estimated 3.3 million people of Bolivia in areas with incidence of smallpox or with relative density of population would be vaccinated during the attack phase of the campaign in 1958.

Personnel and Equipment

During the attack phase the smallpox vaccination service of the Servicio, full strength, consisted of 11 teams of vaccinators and supervisory and supportive personnel, a total of 83 persons. Each team of four vaccinators was headed by a team leader who was responsible for quantity and quality of the vaccinations, discipline of the vaccinators, and maintenance of equipment. A physician and two inspectors were assigned to direct and inspect the operations of each of the five teams. A director of the service, an administrative assistant, 17 drivers, and 3 boatmen completed the organization. In addition, the vaccination service had the full support of the administration, health education, and statistics divisions of SCISP, as well as substantial support from other agencies and the public.

Each vaccinator carried a portable vaccination kit which contained all necessary materials for vaccination house to house. The kit included disposable sterile pins, lyophilized vaccine, diluent (50 percent glycerine), and an indelible dye (10 percent silver nitrate).

The motorized teams, inspectors, and physicians were provided with four-wheel drive vehicles equipped with winches and loudspeakers. Three launches powered by 12-hp. outboard motors transported a fluvial team.

The teams were also supplied with portable battery-operated loudspeakers. The staff received two sets of uniforms and boots. Adequate campaign equipment and supplementary rations were issued.

Vaccination Techniques

Only lyophilized vaccine was used in the campaign. The vaccine was supplied by the Institut de Vaccine, Paris, and the Instituto Nacional de Salud Pública, Lima. At no time was the vaccine refrigerated. Some of the vaccine had been stored for as long as 1 year prior to use. Routinely, the potency of the vaccine was retested prior to issuance. The minimal standard for potency required confluency at 1:1,000 dilution with the method of Force and Leak; all lots from Lima and Paris produced confluency at greater dilutions.

The vaccine was reconstituted with a 50 percent solution of glycerine and distilled water by the team leader in the field. Any reconstituted vaccine remaining unused at the end of the day was discarded.

The vaccination procedure was simplified by eliminating the prior application of alcohol or other virucide and by using a sterile, disposable pin for each inoculation. A drop of vaccine was placed over the insertion of the deltoid of the left arm and a single scratch of about 5 mm. in length was made through the drop without drawing blood.

Using the single scratch, which provides visible evidence of vaccination, facilitated uniformity of technique. Consequently, standards could be maintained. The little finger of the vaccinee's left hand was dipped in indelible ink to expedite subsequent inspection of the quantity and quality of the vaccinations. No vaccination certificates were issued, and the vaccinators kept no records other than noting in an itinerary the number of vaccinations and the lot number of the vaccine.

Inspection

The inspectors followed the vaccinators, reading the takes on the ninth day and checking the work of a different vaccinator each day. With 1 inspector for every 8 to 12 vaccinators, the work of every man was reviewed at least once every 2 weeks. The samples inspected consisted of a sufficient number of households to obtain, whenever possible, a total of at least 100 individuals in each locality or subdivision covered by a vaccinator during 1 day. The inspectors recorded the name, age, evidence of previous smallpox, and previous and current

Smallpox has been eliminated from North and Central America. In 1958 smallpox eradication programs, assisted by the Pan American Sanitary Bureau, were being undertaken in eight American countries. Intensification of efforts in three countries with residual foci would rapidly eliminate smallpox from the Western Hemisphere.

Endemic smallpox has been banished from Europe, U.S.S.R., Australia, and certain areas of Africa. However, the Eastern Hemisphere still contains major endemic foci. Asian countries provide about four-fifths of the smallpox cases reported worldwide and a major proportion of exportations of smallpox to other countries (4). The African Continent contains the second most important focus.

The establishment of the priority for smallpox control and, likewise for eradication, involves consideration of the relative importance of the disease in the light of mortality, morbidity, and sequelae, and cannot be limited to the magnitude of the problem remaining, with existing control efforts being taken for granted. Rather, future as well as current action is justified by the potential of smallpox in the hypothetical absence of existing control efforts.

Smallpox is one of the most contagious diseases. There is no specific treatment. Prior to the advent of vaccination, susceptibility was universal, and almost all persons were attacked. Those who recovered from the disease were disfigured, if not blind. Fatal in one in every three or four cases, smallpox depopulated cities and nations. During an epidemic in Iceland in 1707 smallpox killed 36 percent of the total population in 1 year.

Despite the prevailing policies of control, smallpox is still only too prevalent in many areas of the globe. With reporting very incomplete, an annual average of 178,000 cases was notified to WHO in the 5 years 1951-55 (4). This situation requires either an extension of complex and continuing systems of control to all areas of the globe or short-term campaigns so placed and timed as to lead to the worldwide eradication of smallpox.

A policy of eradication is favored by the relative amenability of smallpox to eradication. From the point of view of the individual, vaccination is a specific and reliable protection

against smallpox, involving minimal inconvenience. From the point of view of health authorities, no other preventive measure can be extended with such ease, economy, and effect.

Vaccination is unquestionably the most effective of all preventive procedures, having been credited with saving as many lives as all the rest of preventive and curative medicine since Jenner's discovery in the 18th century (5). Now that lyophilized vaccine exists, only the ultimate utility of a thermostabile vaccine remains to be exploited. Full utilization of the vaccine would break the chain of infectious cases on which the smallpox virus depends for its continued existence, carrying disease prevention to a logical conclusion—eradication. Thus smallpox is an anachronism. Thomas Jefferson, an early active supporter of vaccination, wrote to Jenner in 1806, "future nations will know by history only, that the loathsome smallpox has existed."

There is a growing awareness of the national obligation to eliminate endemic smallpox in recognition of the right of other countries to be protected against the reinfection of areas freed of smallpox. Thus the intensified national efforts represent contributions to international health. If it is accepted that the whole world benefits from national campaigns which are an integral part of worldwide eradication of smallpox and that the costs of the campaigns exceed by far the costs of technical assistance, then the more prosperous countries, already freed of smallpox, cannot expect to share the benefits without sharing the cost of the national operations. The alternative is for the countries with endemic smallpox, large populations, and little surplus for investment to assume the major financial burden of eradication.

Mass vaccinations probably can be limited to the endemic foci. Costs, globally distributed, should not be a major obstacle when total costs of vaccination by mobile teams in sparsely populated areas are in the order of 5 cents per capita.

The Eleventh World Health Assembly noted that the funds devoted to smallpox control and vaccination throughout the world exceed those necessary to eradicate sources of the infection. Moreover, eradication represents a capital investment that makes the recurrent costs of con-

dedication to vaccination. The indelible dye not only saved time but provided a more reliable record for inspection purposes than histories or vaccination certificates.

As a result of the high average of vaccinations per man-day, the costs of the campaign, including personnel, vehicle, equipment, vaccine, and all other expenses, were held to 5 cents per vaccination.

The dramatic reduction in reports of smallpox best illustrates the results of the attack phase. In 1957 Bolivia suffered the highest attack rate for smallpox in the Americas. By the end of 1958 Bolivia enjoyed one of the highest levels of immunity and experienced an apparent cessation of transmission (table 3). Since November 1958, no smallpox has been reported in the Weekly Epidemiological Reports of the Pan American Sanitary Bureau.

The efficiency of the methods and the efficacy of the lyophilized vaccine are confirmed.

Consolidation and Followup

During the consolidation phase, to be completed by four mobile teams in 1959, vaccinations will be extended to those in sparsely populated and rather inaccessible areas not reached during the attack phase.

With the completion of this phase the Servicio will have discharged the mandate of the bilateral project agreement. Unless the agreement is amended and extended, maintenance of vigilance and a high level of immunity will be a function of the Ministry of Public Health.

Now that smallpox is no longer endemic in Bolivia the occurrence of a single case must be considered as an emergency and treated accordingly. The prevention of rapid recurrence of widespread infection will require the

maintenance of a complete and efficient system of defense including a network of centers and mobile teams for vaccination and revaccination, early recognition of any residual focus and imported cases, reporting, laboratory confirmation, casefinding, and contact and ring vaccination in remote rural as well as urban areas. Arrangements for the continued importation or the national production and testing of lyophilized vaccine will also be necessary.

The high level of vigilance and immunity will have to be maintained even after the completion of campaigns in other South American nations removes the source of this disease from the American Hemisphere until global eradication is achieved.

Global Eradication

Abrupt elimination of one of the principal foci in the American Hemisphere by a mass campaign in the face of a unique combination of factors adverse to control through routine services illustrates the feasibility of smallpox eradication by a systematic attack on the sources of the disease.

The campaign in Bolivia, assisted by the International Cooperation Administration, formed an integral part of a hemispheric campaign. In 1950 the governing bodies of the Pan American Sanitary Organization recommended that the member governments undertake systematic programs of smallpox vaccination and revaccination in their respective territories with the aim of eliminating the disease from all parts of the Western Hemisphere. The Pan American Sanitary Bureau drew up a program designed to stimulate the efforts of the Americas (3).

Table 3. Cases of smallpox reported by the Ministry of Public Health, Bolivia, to the Pan American Sanitary Bureau, by 4-week periods, 1955-59

Year	Total	4-week periods												
		1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
1955	356	15	7	58	38	35	16	36	8	16	30	42	17	38
1956	417	29	11	7	22	38	28	41	77	38	23	43	19	11
1957	1,310	36	31	38	56	94	276	189	141	148	106	121	53	21
1958	183	14	16	11	4	13	11	27	45	32	8	1	1	0
1959		0	0	0	0	0	0	0						

the fatherless family

PREVENTION of serious family disturbances, rather than their treatment, was the keynote of the biennial meeting of the Family Service Association of America, April 1-3, 1959, in Washington, D.C.

A feature of this new emphasis is family life education. The delegates, representing 286 family counseling agencies, were told that large numbers of people in community groups are being introduced to the basic patterns of human behavior through lectures and demonstrations. Areas of focus in this education program are largely determined by participants to heighten the material's usefulness.

Other papers discussed and analyzed "rejected" fathers in the contemporary mother-dominated family, and analyzed the functional position of the American family, as well as mother-child relations and special problems of the aging.

A topic ranking high among the most relevant and pressing was the fatherless family, on which the following summarizes two approaches.

The Imbalance Factor

Citing the country's large number of broken families, Ruth J. Peterson, district director of the Family Service of Philadelphia, observed that social pressures are no longer sufficient to stabilize marriage; it must be done through inward cohesion. In the fatherless family, that

cohesion is disrupted by an imbalance in the potential for fulfilling each member's needs. The degree of imbalance hinges on the cause of the father's absence, the mother's emotional health, and the level of emotional maturity already reached by each child.

Reviewing recurrent patterns of disturbance, Peterson first turned to those fatherless through an act of fate. Normally in such a family, she explained, each member adjusts to loss of the father, through an individual sense of identity. None feels permanently destroyed, nor does he feel to be the destroyer. When healing is blocked, as in most cases referred to social agencies, the first task is to analyze the reactions to crisis and to sift for emotional factors. Significant are the emotional currents between the parents at the time of death and the way the mother is meeting her own dependency needs. For example, out of guilt over her hostility to the father for leaving her, is she tied to following his instructions? Does she gratify her needs through her children, thus hindering their further emancipation? Is there psychosexual regression to the preoedipal period, bringing rivalry with the children.

After loss of the father, the children's attachment to the mother heightens, often with strong ambivalence. On the whole, the children's reactions reflect the mother's demands and the level each had reached in resolving the oedipal conflict. Peterson offered the following illustration. Mrs. W., whose husband died

trol redundant. The Assembly recommended to all governments that the population be vaccinated where principal endemic foci exist and subsequently where the disease persists. The Assembly also recommended that all countries in which smallpox vaccination is compulsory continue to give smallpox vaccinations during the eradication of this disease throughout the world.

At the Twelfth World Health Assembly in May 1959 the arguments in favor of smallpox eradication were reiterated, and the urgency of worldwide eradication was emphasized. It remains for the governments to initiate timely cooperative action.

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H. Trendley Dean Retires

Dr. H. Trendley Dean retired July 19, 1959, as secretary of the Council on Dental Research of the American Dental Association.

His pioneer research and continuing study on the effects of adding fluoride to city water supplies established Dr. Dean as an international authority.

One measure of his contribution is that a population of 35.6 million persons in 1,800 cities throughout the United States use public water supplies to which fluoride has been added to inhibit dental caries.

Before joining the association in 1953, Dr. Dean was associated for more than 30 years with the Public Health Service.

Dr. Dean's research into fluoridation dates back to the 1930's. During a study of mottling of teeth in communities where there was a high concentration of fluorides in the water, Dr. Dean and his associates observed also that the tooth enamel was unusually well preserved.

This observation led to a long-term study

to determine the level that would avoid staining of the enamel and still check tooth decay.

In 1942, following a study of 21 cities in which more than 7,000 children were examined, Dr. Dean and his fellow scientists concluded that: "Where the fluoride level is about one part per million, there are about 60 percent fewer decayed teeth than in nonfluoride areas."

In 1945, Grand Rapids, Mich., became the first city to add fluorides to its water supply. The measure has been employed since then in communities in Brazil, Chile, Colombia, England, Germany, Holland, Japan, Sweden, and elsewhere.

Dr. Dean expects to continue his efforts in support of fluoridation. He feels more strongly than ever that: "The time is past when fluoridation could be considered a 'progressive' step. It is an integral and routine part of any complete public health program. Cities thus far which have failed to adopt the measure are simply failing in their responsibility to the public."

hurt and rejected underneath. She married a successful businessman, but her feelings of worthlessness led to her uncooperativeness, accusations of belittling her, and finally her leaving. Life then centered in her son whom she pushed toward excellence and controlled through her demands. Threatened by the trauma of desertion, she sought help for herself and her son.

Parents Unwed

Most unmarried mothers, Peterson remarked, have passive masochistic tendencies intensified by guilt feelings which are gratified by illegitimate motherhood. The majority have had much emotional deprivation; many are themselves illegitimate and have been rejected. The result is a feeling of worthlessness and little capacity for objective relationships.

The children may be used to vent hostility to the grandmother, through forcing her to care for them, or as a source of gratification, or to force the father into meeting dependency needs. The children feel stigmatized by lack of a father, for which they blame the mother. A daughter may some day air her hostility by becoming another unwed mother. Boys may have strong homosexual tendencies.

Peterson pointed out that the direct diagnosis and treatment of children's emotional problems, developed during the past decade, put family agencies in a preventive as well as treatment role in relation to the community's fatherless families. In her opinion, until living standards are decent for the minority groups providing most of these mothers, there is no base for developing inherent feelings of self-worth. Another need is an adequate number of trained social workers in public agencies for individual counseling, with financial aid as a basic service. Meanwhile, family agencies can offer a realistic diagnostic and evaluation service as well as supportive help in the use of community facilities for positive sources of identification, such as child day care, leisure time activities, or treatment placement.

Pointing to the growing punitive attitude of the tax-paying public toward families with children born out of wedlock, sometimes expressed in tighter eligibility requirements for

aid, Peterson warned that such efforts to force conformity with social standards ignore the original emotional conflicts which produced the illegitimacy.

Aid to Dependent Children

Legislation which penalizes segments of the indigent population underscores the need for telling people more about the goals of public assistance, especially aid to dependent children, declared Mary Brenz, assistant executive director for social services, Philadelphia County Board of Assistance.

Close to 2 million fatherless children receive aid to dependent children, she reported. Commonly, they are described as born to shiftless women, mostly unmarried, in filthy homes, and growing up into delinquents to retrace the mother's behavior patterns. Evidence to the contrary, she said, is shown in findings of a current, representative study in Philadelphia. The meager aid is generally a stopgap in the child's early years. Also, there is a high degree of social breakdown. In a similar 1953 study, only 3 percent of children covered in this aid program were in neglect cases, and 2 percent in delinquency hearings, not above the city's average.

Brenz pointed to built-in features of the program that bring in many more families broken by discord or lack of planning than by an act of God. A widow's children, for example, are blanketed under social insurance. Cases of desertion predominate. Usually those who plan to break the marriage legally also plan for the future.

In desertions, most frequent in large cities with their opportunities for anonymity, the father may reappear and disappear, making any plans haphazard. This also characterizes the lives of unwed mothers.

Brenz's experience has shown that status is a pervasive ingredient of social breakdown which ends in desertion and illegitimacy. The latter occurs most often among women with little economic or social stake.

She also pointed out that by custom unwed Negro girls tend to keep their babies. Further alliances are more likely to result in more illegitimate children than with those who give up their babies and plan normal lives.

after a 2-year illness, was still hostile to her mother for a lifetime of demands, including care of siblings. Feeling little worth as a woman, she resented her husband's domination and his failure to share child discipline. Following treatment which allowed venting her hostility, she supported treatment of her daughter, who had withdrawn from her friends in what was diagnosed as anxiety hysteria. The girl projected onto all, the "duplicity" of her father who had died when she was "unprepared." By airing her oedipal fantasies and working through her anger, mother-daughter relations gradually improved.

Sometimes early help to the mother might have resolved the conflicts of both mother and children, continued Peterson, citing the maladjustment of Mrs. Y. and Andre, which stemmed from this mother's consistent refusal to reveal the father's death to her son. In war-torn Europe, Mrs. Y.'s mother and brother had been murdered shortly before her marriage to Mr. Y., who she felt replaced both. On Mr. Y.'s urging, she consented to come to this country, to avoid responsibility for denying 3-year-old Andre the benefits of growing up here. After loss of her husband 6 months later, she refused an opportunity for higher income in her native land, and only when Andre reached 8, told him of Mr. Y.'s death. Irregular behavior at school followed, leading to casework interviews. They revealed Andre's retarded ego development and hostility to his mother caused anxiety resulting in a mixed neurosis with anxiety hysteria and obsessive compulsive features.

Often disturbances emerge first during adolescence, Peterson remarked, when withdrawal sometimes alternates with aggressive acts. School work suffers; previous defenses no longer suffice; and the adolescent's greatest fear is his loss of self-control. All this may stimulate the mother's unconscious conflicts, her resulting pressure aggravating further acting out which confirms the adolescent's feeling of worthlessness.

Homes Broken Voluntarily

Peterson pointed out that families with the father absent through separation, desertion, or divorce far outnumber other fatherless families

on social agency registers. Here may be the added conflict around reunion and the responsibility for breaking up the home. Most often the mother has been left.

Success in adjustment hinges on the duration, degree, and openness of the marital conflict before the break. Most of these mothers, in Peterson's opinion, lacked the maturity and self-awareness to choose suitable partners, to realistically assess each partner's ability to meet the other's demands, and to understand and adjust to parenthood. They also commonly lacked certainty about themselves in the passive feminine role. Peterson stressed ascertaining at what psychosexual stage growth had been retarded. If in the preoedipal period, for example, receptive needs may be insatiable. Overidentification with the children and identification of one child with the father are also possible.

Diagnostically, it is vital to know the mother's relationship with her parents, asserted Peterson, as in the case of Mrs. G. Her hostility to parental authority had found expression in her marriage to Mr. G., who was illiterate and physically cruel. Her sadomasochistic disorder kept her silent about her husband's incestuous relations with the daughter and abuse of the other children, until known outside. On release from prison, Mr. G. was restricted to another part of the State: the daughter, who had identified with the mother, was helped toward a better reality adjustment; and the oldest boy, with irreversibly defective psychosexual development, was encouraged to broaden his life through wholesome activities. The children's treatment allowed Mrs. G. wider outside interests.

Frequently, stated Peterson, even though there are realistic reasons for ending a marriage, the wife's feeling is one of rejection and failure, the depth of these feelings gauging how much she accepts the feminine role. Symptoms may be depression and projection of blame on the partner. An example was Mrs. X. who developed anxiety with somatization over her adolescent son's visits with the father. Features of her childhood were insecurity, a strict stepmother at age 5, and loneliness during adolescence. Feeling incompetent as a woman, she entered business, was successful, but remained

The Federal Budget Process

RALPH BAHN, M.C.S., C.P.A.

MANY MEDICAL PEOPLE in administrative positions consider budgets and the budget process a form of mystic symbolism and ritual, with its own priesthood called budget officers. Many laymen react the same way to the medical profession. From a layman's viewpoint, the doctor asks some questions, grunts a couple of times, putters around with the patient, sometimes using awesome gadgets, and pontificates a diagnosis. In both situations, lack of understanding of the purposes and specific processes creates uncertainties and possibly fear.

It is hoped that this report on the budget process, by describing the process and the logic behind it, will dispel some of the mysticism.

Budgeting is closely related to financial planning and management, although the term may properly be used in a more general sense of planning. All of us, consciously or unconsciously, do a great deal of budgeting. For example, a family's standard of living is budgeted against its financial resources. The corner storekeeper, formally or informally, budgets his cash outgo to coincide with his estimate of cash income. Larger organizations use similar but more sophisticated techniques to arrive at the same result.

By their very nature, public health activities are financed almost entirely by governmental bodies (Federal, State, county, municipal, and other political subdivisions). Administrators,

or prospective administrators of public health programs, find that budgeting plays an increasingly important role in their professional careers.

There are about 100,000 units of government in the United States (1), including the United States itself, States, counties, incorporated places, towns and townships, and school districts. Many of them have slightly different forms of government. Since budgetary management is intimately related to the political division of authority between the executive and the legislature, in accordance with charters and precedents, the budgetary processes of the various units differ, and no one system can completely fit them all. However, although terminology and the names of the various executive and legislative groups which have roles in budgetary management may differ, certain basic budgetary processes are used by the majority of these units.

The large and varied financial programs of the U.S. Government affect all citizens. Because of the intense interest in Federal programs by many individuals and groups, this report will use the terminology and procedures of the U.S. Government as an example. Because of its vast size and scope, however, this process may be more complex than that of other units of government.

Definition of a Budget

In a nongovernmental organization, a budget is defined as a financial plan of program operation for a specific period of time, expressing the use of men, other services, and matériel in a common denominator: money. In governmental bodies, it means the same thing with the

Mr. Bahn is financial management officer of the Bureau of Medical Services, Public Health Service. This article is based on lectures he gave at the Graduate School of Hygiene and Public Health of Johns Hopkins University in 1958 and 1959.

Pinpointing some unresolved questions in casework for the aid to dependent children program, Brenz described the cycle of inherently difficult cases and heavy caseloads, the high turnover of caseworkers, and insufficient rapport between clients and caseworkers. Eligibility terms are often harsh and grants barely provide subsistence.

Broadened Approaches

Brenz pointed out that public agencies, unlike private services, cannot limit their intake, or dispose of cases as untreatable. Many cases covered by aid to dependent children had been abandoned by the highly skilled workers of private agencies. Seeking solutions, Philadelphia has limited caseloads for some workers and used authority in working with public assistance families. Referring to Family Services Units of England, which handles only "hopeless" cases, Brenz outlined a personal approach designed to guide the client. To win the client's confidence, the caseworker may tidy house or scrub the floors.

At this point, Brenz warned against the inadequately trained caseworker translating her own biases unconsciously into standards for

clients. "We already have almost the power of life and death over our clients in that we represent their bread and butter," she said. For effective help to fatherless families on public assistance, she recommended:

- Grants adequate for living rather than for bare subsistence, so that these families really be given "a chance to try."

- Broader information programs about aid to dependent children to help dissolve punitive attitudes into understanding and willingness to support adequate grants and a sufficient and adequately paid staff.

- Guidance from the Department of Health, Education, and Welfare on the desirable pattern and scope of services for public assistance agencies. One area would be the acceptable minimum grant and constituent items.

- Wider cooperation of other social agencies, such as child guidance clinics.

Partnership with other community resources, she concluded, will put the needs of fatherless families into sharper focus.

The papers by Miss Peterson and Miss Brenz appear in full in a pamphlet published by the Family Service Association of America, 215 Fourth Avenue, New York, N.Y.

Study of Medical Care for the Indigent

Means of assuring adequate medical care for an estimated 6 million persons on public relief rolls may be indicated in a study of 20,000 individual welfare records at the University of Michigan School of Public Health. Supported by the American Public Welfare Association, the project began in 1957.

According to Dr. Solomon J. Axelrod, the school's professor of public health economics and principal investigator of the project, "The problem of providing medical care for these people is immensely complex. Many of them were forced onto relief in the first place because they were sick."

During this initial phase of the project, the sample data have been collected from welfare departments in Connecticut, Illinois, Maryland, and Rhode Island. Research is now

focused on the amount and kind of medical care given recipients of old age assistance.

"More and more of the aged are depending on old age assistance for medical care, even while drawing social security payments," Axelrod reported, because these payments "in many cases do not provide enough money for medical attention."

Other objectives of the project are the clarification of certain administrative problems, such as the larger proportion of funds spent on prescribed drugs than on physicians' services in some of the medical care programs for recipients of old age assistance and the question of long-term hospitalization for the aged. Often the elderly have long hospitalizations simply because of the lack of another place to stay, Axelrod remarked.

Table 2. Summary schedule of program and financing

	19-5 actual	19-6 estimate	19-7 estimate
<i>Program by activities:</i>			
1. Experimental processing.....	\$377, 561	\$392, 939	\$372, 500
2. Research.....	199, 224	232, 064	241, 200
3. Administration.....	106, 285	100, 897	94, 700
4. Reimbursements from other agencies.....	-8, 810	-10, 000	-10, 000
Total obligations.....	674, 260	715, 900	698, 400
<i>Financing:</i>			
Unobligated balance no longer available.....	740
Appropriations.....	675, 000	715, 900	698, 400

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marized to obtain a total cost for operating the department or organization. A summary of these appropriations provides an organizational budget classification.

Performance or program budget. Today much emphasis is placed on what is described as a performance, or program, budget, in contrast to budgets based solely either on objects of expenditure or organizational units. The performance, or program, budget as defined by the Hoover Commission is a "budget based on function, activities, and projects . . . which would focus attention on the general character and relative importance of the work to be done, or upon the service to be rendered, rather than on the things to be acquired, such as personal services, supplies, equipment, and so on. . . . The all-important thing in budgeting is the work or the service to be accomplished and what the work or service will cost." Table 2 is a sample of the summary program and financing schedule. This schedule is still supported by the object class distribution listed in table 1.

Cost-type budget. Cost-type budgets are based on data geared to accrual accounting. Accrual accounting, which is generally used in private businesses, bases its costs on actual consumption of goods and services rather than on obligations. Table 3 converts table 2 into a cost-type budget. This is done by merely accruing inventories of goods and services carried

over from year to year. In table 3, in the column headed 19-6, obligations of \$715,900 are adjusted to a cost of \$678,519 because \$37,381 worth of supplies and equipment purchased out of 19-6 monies were not used. In column 19-7, obligations of \$698,400 are converted to costs of \$711,300 resulting from greater use of supplies and equipment in 19-7 than were purchased in 19-7. (Public Law 863, enacted August 1, 1956, provides that Government appropriation requests shall be developed from cost-based budgets in such manner and at such time as may be determined by the President.)

Historical Background

In order to understand reasons for current budget processes, it is necessary to review the conditions and situation which led to budget reform in the United States.

From the establishment of the U.S. Government in 1776 to as late as 1921, "no provision existed . . . for preparation by an agency of a single, consolidated statement of prospective revenues and of the estimated expenditure needs of Government—so prepared as to reveal the relations between the two and to furnish an intelligent guide to Congress of the policies that should be adopted by it in respect to increase or decrease of taxation, the incurring or eliminating of debt and the voting of funds for the conduct of the U.S. Government" (3).

additional provision that when a budget is formally approved, certain controlling factors of it become law, and the law is the controlling instrument over financial operations of that governmental body.

The budget is a means of orderly financing which is necessitated by the huge financial programs of modern governments. "In democratic governments it permits the people, through their representatives, to retain control of public finance" (2).

The budget document is essentially an estimate of future governmental income, expenditures, and fiscal conditions. The document also customarily includes a report on the finances of the previous and present fiscal periods. For example, the U.S. budget for 1960 shows actual data for fiscal year 1958, estimated data for fiscal year 1959, and estimated income and expenditures for the budget year, 1960.

The budget process can be defined as the ac-

tivities in the preparation, legislation, execution, and control of the budget.

Types of Budgets

Object classification budget. Many years ago budgets were almost exclusively based on an object classification. This type of budget listed in varying detail the positions to be filled and the specific items of supplies and equipment to be purchased. Sometimes there would be one appropriation for personal services and another for the other object costs of a given organization. Table 1 is a sample of this type of summary budget schedule. In addition to the data shown, these budgets were supported by detailed lists of positions to be filled.

Organizational budget classification. Because of the large numbers of appropriations which can be involved in support of a given department or organization, the appropriations are placed together in the budget and sum-

Table 1. Summary schedule of obligations by objects

<i>Object classification</i>	<i>19-5 actual</i>	<i>19-6 estimate</i>	<i>19-7 estimate</i>
Total number of permanent positions.....	58	60	61
Full-time equivalent of other positions.....			4
Average number of all employees.....	54	50	48
Number of employees at end of year.....	50	49	50
Average salaries and grades:			
Average salary.....	\$6, 140	\$6, 540	\$6, 620
Average grade.....	GS-8. 4	GS-8. 5	GS-8. 5
01 Personal services:			
Permanent positions.....	\$321, 520	\$311, 900	\$310, 500
Regular pay above 52-week basis.....	1, 318	1, 200
Total personal services.....	322, 838	313, 100	310, 500
02 Travel.....	61, 890	54, 200	52, 800
04 Communication services.....	11, 871	12, 000	12, 000
05 Rents and utility services.....	29, 148	30, 000	30, 000
06 Printing and reproduction.....	416	600	500
08 Supplies and materials.....	242, 379	253, 000	282, 300
09 Equipment.....	5, 718	53, 000	10, 300
Total obligations.....	674, 260	715, 900	698, 400

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ative prosperity and the fact that Federal taxes were almost entirely indirect and scarcely felt by the individual taxpayer.

The rapid development in the scope and amount of governmental expenditures, with an increasing burden of taxation on individuals, focused popular attention on the problem of obtaining more efficient administration of governmental units and led to the adoption of modern budget procedures by the Federal, State, and local governments.

Budget Reforms

In 1921 passage of the Budget and Accounting Act led to a reorganization of Federal financial operations.

The most important change brought about by this act was to place upon the President direct and complete responsibility for preparing and submitting to the legislature, at the beginning of its regular session, a budget which would represent his administration's work and financial programs and his recommendation for financing them. It also prohibited any other employee of the executive department from submitting any other budget recommendations unless requested to do so by a member of Congress. By implication, this also prohibited any executive department employee from submitting any general legislative recommendations which could lead to the need for new funds. The act also provided the President with staff to assist him in handling the financial management of the government. This organization is called the Bureau of the Budget. (Originally established in the Treasury Department, it was transferred to the Executive Office of the President in 1939.)

The 1921 act also authorized an audit staff, under control of and reporting to the legislature. This staff, called the General Accounting Office, reviews the execution of the administration's work and financial programs. Executive department officials, seeking clarification of legislative intent in connection with ambiguous legislative language, may obtain legal opinions from the General Accounting Office to avoid error or criticism.

Concurrently with the passage of the Budget and Accounting Act, both the House of Repre-

sentatives and the Senate amended their rules of procedure to require clearance of all appropriation requests through a single committee on appropriations in each House. In addition, they agreed that the committee on appropriations shall not have power to report bills containing general legislation and that a separate committee would handle all revenue bills.

Subsequent amendments to the Budget and Accounting Act of 1921 have tended to increase the authority of the Bureau of the Budget and the President over governmental fiscal operations.

This general pattern of reform adopted by the United States has been adopted also by many State and local governments.

The Budget Process

The Federal budget process is necessarily continuous. With regard to annual appropriations, the process requires constant review of the current year's program and review and cleanup of previous years' activities. Concurrently with these reviews, plans must be made for 1 or 2 years in the future. For example, agencies are operating under fiscal year 1960 funds, liquidating obligated balances of prior years, preparing 1961 estimates for processing through the Bureau of the Budget and the Congress, and developing plans for the 1962 preliminary estimates.

Omitting the overlapping in the various budgets, a typical budget calendar is outlined on p. 788 and the cycle for a single annual budget is reviewed below. If the preliminary estimates were excluded and the names of participating organizations and possibly the time intervals were changed, the calendar would have many similarities to State and local budgetary calendars and processes.

Preliminary Estimates

Each spring, the Bureau of the Budget makes a fresh review of the budget outlook for the Government as a whole. This review is used as a basis for determining policies to be recommended to the President for use by the agencies in the preparation of their formal budgets. To assist in this review each large agency develops a preliminary estimate, which is a broad pro-

Estimates were prepared by the various departments and submitted to the Treasurer of the United States. The Treasurer, in turn, passed them on to the Congress without review as to need, duplication of services, or available revenue. The President had little or no function in the budget process.

"In the House of Representatives, the estimates were reviewed by eight distinct committees, each acting independently of the others, and no one having overall responsibility for relating expenditures to available resources and prospective income" (3). Sometimes different committees reviewed separate portions of a department's estimates with the result that the de-

partment could shop the "easier" committee for appropriations.

The system for handling finance measures in the Senate repeated all the mistakes in the House and added a few more.

"In addition, conference committees, reconciling appropriations bills between the versions approved by the two legislative bodies, violated their own rules of procedures by changing items beyond the areas of disagreement" (3).

Similar chaos existed in most State, county, and municipal governments up to the early 1900's.

This system of fiscal anarchy was tolerated in the Federal Government because of its rel-

Table 3. Summary schedule of program and financing adjusted for accrual

	19-4 actual	19-5 actual	19-6 estimate	19-7 estimate
<i>Program by activities:</i>				
1. Experimental processing.....		\$369, 225	\$370, 510	\$380, 200
2. Research.....		194, 222	218, 607	245, 900
3. Administration.....		105, 729	99, 402	95, 200
4. Reimbursements from other agencies...		-8, 810	-10, 000	-10, 000
		<hr/>	<hr/>	<hr/>
Total costs.....		660, 366	678, 519	711, 300
<i>Relation of costs to obligations:</i>				
Increase of costs of selected resources available for future application to activity costs (see below).....		13, 894	37, 381	-12, 900
		<hr/>	<hr/>	<hr/>
Total obligations.....		674, 260	715, 900	698, 400
Unobligated balances no longer available..		740
		<hr/>	<hr/>	<hr/>
Appropriations.....		675, 000	715, 900	698, 400
		<hr/>	<hr/>	<hr/>
<i>Selected resources at June 30:</i>				
Supplies and materials.....	\$8, 804	3, 225	5, 000	-1, 000
Prepaid expense.....	2, 263	1, 847	1, 200	800
Equipment.....	3, 727	17, 342	50, 000	60, 000
Accrued depreciation.....	-704	-2, 606	-4, 000	-9, 000
Unliquidated obligations.....	835	9, 011	14, 000	2, 500
		<hr/>	<hr/>	<hr/>
Total selected resources.....	14, 925	28, 819	66, 200	53, 300
		<hr/>	<hr/>	<hr/>
Increase or decrease.....		13, 894	37, 381	-12, 900
		<hr/>	<hr/>	<hr/>

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Calendar for 1960 Budget Estimates—Continued

Allotment

February 1959

House subcommittee on appropriations holds hearings on estimates. Witnesses from divisions, bureaus, Service, and Department defend them.

March 1959

House Appropriations Committee reports out recommendations. House acts on recommendations.

April 1959

Senate subcommittee on appropriations holds hearings.

May 1959

Senate Appropriations Committee reports out bill. Senate passes bill.

June 1959

Conference committee from both Houses irons out differences, if any. President signs bill, enacting bill into law.

Apportionment

June 1959

Divisions request Budget Bureau apportionment of funds appropriated.

June 1959

Divisions notify field stations of annual allocation and issue allotments of first quarter funds, in accordance with approved apportionments.

September 1959

Divisions issue second quarter allotments.

December 1959

Divisions issue third quarter allotments.

March 1960

Divisions issue fourth quarter allotments.

Reporting

Monthly, fiscal year 1960

(July 1959–June 1960)

Each echelon reviews monthly reports on obligations and expenditures. Compares with allotments and apportionments.

Cleanup of Funds Not Available for Obligation

July 1960–June 1962

Public Health Service closes out fiscal year 1960 accounts.

views the estimates of its subordinate levels. This review (a) checks compliance with policies, (b) eliminates duplication, (c) adjusts the various estimates for balance within that program level, and (d) recommends estimates to the next higher echelon. In this way, estimates are built like a pyramid for a division, a bureau, a department, and finally the U.S. Government.

Most Federal budget appropriation requests are submitted to the Bureau of the Budget and the Congress only for activities for which basic legislation exists. (Basic legislation is law authorizing the Government to do something new or extending existing authorization to continue something already being done.) This practice, based on precedent established by the President in 1921, serves two purposes; (a) it avoids placing pressure on the executive department to request appropriation of funds for activities, no matter how desirable, not yet approved by the Congress, and (b) it avoids

legislation subject to easy defeat by a "point of order." Basic legislative items appended to an appropriation bill in violation of existing congressional rules may be eliminated by any member of Congress, during the course of debate on the bill, simply by raising a "point of order."

The Bureau of the Budget consolidates the preliminary estimates of the large agencies and adds an informal estimate for the smaller ones to determine total governmental fiscal requirements for proposed agency programs. These requirements are compared with estimates of revenue to provide the budget outlook for the Government as a whole.

The Director of the Budget Bureau meets with the agency heads individually to discuss the agency's budget in relation to the overall fiscal outlook. In these meetings the agency head reviews his organization's operations and summarizes the need for his proposed programs.

Calendar for 1960 Budget Estimates, Bureau of Medical Services, Public Health Service

(Annual Appropriation)

Preliminary Budget Estimates

January 1958

Bureau issues call for 1960 preliminary estimates from divisions. Large divisions request data from field installations.

April 1958

Divisions summarize, review, adjust, and recommend their estimates to Bureau. Bureau summarizes and reviews estimates, and passes on approved Bureau estimates to Surgeon General.

May 1958

Surgeon General summarizes and reviews all Public Health Service estimates, and passes on approved Public Health Service estimates to the *Secretary of the Department of Health, Education, and Welfare*.

May 1958

Department compiles and reviews all constituent estimates and submits them to Bureau of the Budget.

June 1958

Budget Bureau summarizes all Government estimates, reviews programs, compares costs with estimates of income, and recommends budget policies to President. President approves governmental budget policies and level of operations.

July 1958

Department and Budget Bureau negotiate authorized budget allowance. Sum of all departmental estimates cannot exceed agreed-upon total. Department allocates budget authorization among constituents. Public Health Service, as a constituent, subdivides its allocation among its bureaus and divisions.

Formal Budget Estimate

September 1958

Department submits formal budget estimate to Bureau of the Budget.

November 1958

Budget Bureau "marks-up" formal budget submission and consolidates estimates in the Budget of the United States Government.

November 1958

Divisions prepare congressional budgets based on "marked-up" budget to be published in the Budget of the United States Government for fiscal year ending June 30, 1960.

Legislation

January 1959

President gives budget message to Congress.

gram document outlining the agency's current and future operating and financing programs.

In developing the call for preliminary budget estimates, each echelon of Government outlines its basic policies and assumptions within the framework allowed by higher echelons. For example, a department may list its basic policies and assumptions for the preparation of department estimates. Within this framework, bureaus and divisions may add criteria which do not conflict with the criteria of the higher echelons.

To justify budgetary estimates more fully, many Government agencies obtain participation in formulating the preliminary estimates at the lowest organizational level at which this is feasible.

The call for estimates requires each supervisory level to review existing programs and make decisions on whether or not program emphasis should be modified, based on changes arising from conditions, resources, or accomplishments.

Each supervisory level summarizes and re-

appropriation, a statutory authorization to a government agency to incur obligations (obligate) for not more than a stated sum of money, for specified purposes, often within a stated period of time. Several of the more important types are defined below.

annual appropriation, an authorization available for incurring obligations for 1 year only. Most common type in the Federal Government.

multiple-year appropriation, an authorization for incurring obligations for a definite period of time, but in excess of 1 year. Used for seasonal programs or for nonrecurring programs that do not fit into a fiscal year pattern.

no-year appropriation, an authorization available for obligation until the purpose of the appropriation has been accomplished. Used for such work as construction projects, certain research and development programs, and long-lead procurement programs.

appropriation limitations to accomplish specific objectives may be imposed by the legislature; for example, a limit on the amounts which can be spent for specific purposes or a requirement that a minimum amount be spent for a certain purpose. An appropriation on a lump-sum basis for several pro-

grams gives the agency some discretion in varying the use of the funds among programs, but an appropriation specifying the amounts for each program has the effect of imposing a separate limitation on each item very similar to separate appropriations.

apportionment, distribution of an appropriation into amounts available for specified time periods, activities, functions, projects, objects, or combinations of these. Amounts so apportioned limit obligations to be incurred. Generally, apportionments are used to limit obligations for specific time intervals, usually quarters, over the appropriation period in order to prevent organizations from running out of obligational authority before the end of the fiscal period and thereby incurring a deficiency.

allotment, an authorization by head of the agency or his designee to incur obligations within a specified amount pursuant to an appropriation and apportionment. It is a method of subdividing apportioned funds.

obligation results when goods and services are ordered. When they are received, the obligation becomes a legal liability to pay for their purchase.

encumbrance or commitment, the current reservation of funds for a specific future payment.

department may appeal differences on significant items to the President. Subsequently, determinations by the Director of the Budget Bureau and the President are communicated to the agency.

In December, approved budget estimates for all the agencies are brought together and made part of the President's budget document. This is delivered to the Congress together with the annual budget message during the first 15 days of the session beginning in January.

All budget estimates are administratively confidential until released by the President in his budget message to the Congress.

Other Estimates

Amended, supplemental, or deficiency estimates may be submitted to the Congress with the approval of the President (a) to finance programs resulting from enactment of new leg-

islation, after the regular budget has been submitted to the Congress or (b) to meet emergencies or conditions under existing legislation not anticipated when the original budget was prepared.

Legislation

Constitutionally, the House of Representatives originates all revenue-raising bills. The House has uniformly held that the section of the Constitution authorizing it to originate revenue bills (art. 1, sec. 3) was intended to cover appropriation bills as well. Although the Senate has at times questioned this claim, it has generally abided by it.

All appropriation requests are submitted to the House Committee on Appropriations (except that after passage of the appropriation bill by the House certain urgent items may be submitted directly to the Senate Committee

After carefully weighing overall budget objectives against the policies' effect on the programs and responsibilities of each of the larger agencies, the Director of the Budget Bureau recommends to the President the policies to be followed in the preparation of the formal budget. Proposed budget policies and their impact on agency programs are discussed by the President with members of his cabinet.

The President determines the policies to be followed by the agencies and the overall budget objectives of the Federal Government. The objectives may be, for example, a balanced budget, emphasis on national security, and increased international aid. On the basis of these policies and objectives, the President determines the level of governmental expenditures desired. If expenditures are planned to exceed revenues, the President proposes additional taxes or an increase in the Federal debt to finance the excess. If revenues are expected to exceed expenditures, the surplus may be applied to reduce the Government debt.

The President's determination on governmental expenditures is made available to the agencies in the form of a budget allowance, which sets the maximum amount that the agency may request in its formal budget for the fiscal year under consideration. The budget allowances are then allocated by the agency to its bureaus and divisions.

As stated previously, the President is responsible for submitting a budget for his work and financial programs. He is not required to recommend appropriations to the full extent of basic authorizations. He may recommend a lesser amount or no funds at all.

In the evolving budget formulation process, the preliminary estimate appears to be assuming more and more importance in determining the programs to be supported. All governmental budget estimates are highly competitive. They are alternate bids for use of a scarce item: the tax dollar. In the competition for use of this item, a budget proposal generally must be approved in the preliminary process if it is to be included in the formal estimate.

Formal Budget

The budget allowances by the Budget Bureau generally require reductions in program plans

proposed in preliminary estimates. When the reasons for the reductions are given or the items to be eliminated are identified, the agency will generally give serious consideration to the Budget Bureau's suggestions. To include items not favored by the Budget Bureau in the formal estimate is to risk having the item eliminated again in the Budget Bureau's review of this estimate and thus lose authorization which might have been allowed for another desirable purpose.

When the bases for the reductions are not identified, the person responsible for the appropriation programs will determine where cuts are to be made. Although the basic budget data for an appropriation may have been developed with full participation of field staffs, the pressure of time in the processing of the formal and congressional estimates may preclude their further participation.

The departments are generally informed of their budget allowances in July, and they are required to submit their formal budgets no later than September 30. These formal estimates must be prepared in accordance with the allowance limitation and the procedures set forth by the Budget Bureau (4). They list in detail how the requested funds will be spent.

In order to point up important requirements that cannot be accommodated within an appropriation allowance, a supplementary, or "B," budget is sometimes submitted with the formal estimate. The "B" budget is evaluated by the Budget Bureau with the formal estimate, and if the Bureau considers it important enough, it will include funds for the item in the appropriation request.

In October or November the Bureau of the Budget holds hearings on the formal estimates. These afford the Bureau another review of an agency's programs some 5 months after submission of the preliminary estimates. At this time the Bureau may make further adjustments in an agency's budget based on current conditions. Budget Bureau examiners question agency officials, and they may ask them for additional evidence to support their estimates or to revise them. The Director of the Budget Bureau and the agency head endeavor to reach substantial agreement, but the secretary of a

past activities in comparison with the budget and for forecasts of future workloads or fund needs. Each echelon performs its own evaluation on its level and scope of the program.

Periodic financial reports (generally monthly) on the status of allotments or suballotments are an important part of this evaluation. They are submitted from each accounting level to the program chief. Generally, only appropriation reports are submitted to the Budget Bureau, but the Bureau may request such data as it deems necessary (6).

In order to permit operating evaluations in relation to the budget, expenditure accounts should be kept on a functional (program) classification basis consistent with the budgetary classification, or they should be capable of being summarized on such a basis without analysis or adjustment.

The process of review is continuous until the period for which the appropriation is available for obligation expires. At that time unobligated balances are no longer available for use and they are withdrawn.

Sometimes the periodic evaluations show a need to shift funds, within one program activity, from one geographical area to another. This kind of shift is ordinarily within the authority of the program chief. However, an indication of a need for shifts between activities may present complications.

If funds have been appropriated on an individual-activity basis within a budget, no changes between activities are possible without legislative approval. When the appropriation is for a lump sum of money covering several activities, program chiefs may obtain minor adjustments among the activities from higher authority as designated by the head of the department without further clearance. Significant shifts of funds between activities will ordinarily be cleared, prior to the shift, with the Bureau of the Budget and even the chairmen of the congressional subcommittees which normally review the program's budget esti-

mates. This clearance is made to avoid, in subsequent budget hearings, any question as to the agency's good faith in submitting budget estimates.

Since an appropriation limits the funds to be used, some balance must be retained and lapsed to protect the appropriation from a deficiency. Unrecorded obligations must be charged against appropriations for the year in which obligations were incurred. This may occur at any time up to 2 years after the close of the budget year before obligated balances of funds are merged and lose their time-period identification.

Conclusion

The budget can be a source of frustration to a program person who sees a need for spending more money than is available. The needs are as many and as varied as the programs sponsored by governmental units. The pressures for greater expenditures, however, are offset by the pressures of the people for limiting or reducing taxation. In a democratic society, the balance of governmental wants and satisfactions are adjusted slowly as the people express their wishes through their elected representatives.

REFERENCES

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- (4) U.S. Bureau of the Budget: *Instructions for the preparation and submission of annual budget estimates*. Circular A-11. Washington, D.C., June 27, 1958.
- (5) U.S. Code, Title 31, Sec. 665 (C(2)).
- (6) U.S. Bureau of the Budget: *Instructions relating to apportionment and reports on budget status*. Circular A-34. Washington, D.C., July 1957.

on Appropriations). A single subcommittee of the House group considers appropriation bills for one or more agencies. The subcommittee studies the material in the budget, consults with its staff employees, and holds hearings at which the agency head and other key officials are asked to appear. Members of the subcommittee may question them on any point relating to the proposed budget in order to assure themselves that any money appropriated will be spent for approved purposes.

In appearing before congressional committees, agency witnesses are required to defend the President's budget. This requirement is implied, as pointed out above, from the section in the Budget and Accounting Act of 1921 which directs the President to submit a budget of his work and financial programs and prohibits any other employee of the executive department from submitting any other recommendation unless requested to do so by a member of Congress.

Only when specifically requested by a member of Congress may the agency witness offer an opinion or estimate which would be critical of the budget document.

The subcommittee makes its recommendation to the full committee on appropriations. The full committee's recommendation is introduced into the House, accompanied by a printed report that summarizes the programs to be financed and the comments of the committee with respect to them. After debate, the House approves the bill and passes it on to the Senate.

Senate consideration follows substantially the same pattern, and ultimately the appropriation bills are passed by this body.

Differences between the House and Senate versions of appropriation bills are negotiated by "conferees" appointed by each House. Conferees are authorized only to act on differences. They may not consider items not in dispute, but within the range of differences, they have complete freedom to negotiate. Conference recommendations are subject to approval by each House.

When a bill is agreed upon by both Houses of Congress, it is submitted to the President. When he signs it, the appropriation bill acquires the status of a law.

Execution and Control

Enactment of an appropriation bill does not automatically make funds available for use. The funds must first be apportioned by the Budget Bureau. As explained in the glossary on p. 791, apportionment is a method of approving the use of appropriated money generally on a time-interval basis, usually quarterly, to avoid deficiency appropriations. The Budget Bureau also uses the apportionment process to review again the budget program, in light of current conditions, before it is put into operation.

The Budget Bureau has the authority to withhold funds and place them in reserve "to provide for contingencies, or to effect savings whenever savings are made possible by or through changes in requirements, greater efficiency of operations or other developments subsequent to the date on which such appropriation was made available" (5).

In the absence of any specific information to the contrary, funds apportioned and unused in one quarter are automatically available in the succeeding quarters within the budget period. In an annual appropriation, apportioned and unused funds cannot be carried over to another fiscal year without legislative approval.

After funds are apportioned, they are allotted by the head of the agency, or his designee, to the person responsible for the operating program. This individual may reallocate or suballot these funds to lower program levels.

Each allottee is liable to remain within the limits set by the allotter. Every violation, technical or otherwise, must be reported to the President through the Budget Bureau and to the Congress. These reports outline the circumstances of the violation and the action taken against the allottee, if it was due to his negligence. They also review the adequacy of the system of control to prevent recurrence of a deficiency.

In order to obtain maximum efficiency in the use of budgeted resources, provision must be made for continuous statistical and financial evaluation of programs. Data obtained should be used to inform management, at all levels, of changing patterns of program operations. They provide a basis for program evaluation of

Economic Costs of Disease and Injury

SELMA J. MUSHKIN, Ph.D., and FRANCIS d'A. COLLINGS, M.A.

WHAT is the cost of sickness and the price of health? What are the costs and prices of alternative health activities and how much should be spent for control of a disease as compared with other programs? What can we afford to do, and afford not to do, in meeting disease problems?

Such questions are raised repeatedly about the costs of specific diseases and about comparative amounts spent for prevention and treatment. These are issues which quantification of costs and prices cannot resolve alone; but, as Winslow emphasized, such quantification can provide a most valuable tool to assist in consideration of these issues (1).

The arithmetic of economic gains and losses brought about by health programs can be an important tool, especially in planning for economic development in parts of Asia, Africa, and South America. For these countries, the real price of health programs often includes not only expenditures for public health programs but also costs occasioned by pressures of population growth. These pressures have been intensified by a marked fall in death rates from the application of modern public health measures and techniques. It has been estimated, for example, that the introduction of modern medical technology into some of the nonindustrial nations has resulted in a decline in mortality and a net increase of 1 to 2 percent in population per year.

While cost-price equations have more urgent application in health programing in nonindustrial nations of the world, they also apply to

health programing in the United States. They supply a tool for appraising the adequacy of resources devoted to specific health problems and the comparative economic returns from public investment in different disease problems. They permit a summary type of comparison between the costs of a specific disease and the price of the health care associated with the disease. With this type of summary in view, the National Health Education Committee collects information on the major killing and crippling diseases in the United States (2).

Review of existing work on costs of specific diseases and health programs, however, suggests a need for clarifying cost concepts in current use, setting forth in a summary way the information now available to estimate costs, and assessing the additional information required. This paper attempts to meet this need by setting forth a tentative classification of costs based on their effects on the use, distribution, and quantity of economic resources, which may help clarify the concept of economic costs of disease. In the context of each of these cost components, the types of information available for measurement are discussed and the additional information required is summarized.

Economic costs, as we are viewing them here, arise out of the impact of disease and injury upon economic resources. The question we must ask is: What is the difference between what actually happens in the economy now and what might happen in the hypothetical situation where sickness from specific causes is eliminated? In other words: What is the impact of a disease upon the use, distribution, and availability of economic resources?

Economic costs may be more sharply de-

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Signs

and

Symptoms

of trends in public health

The annual report of the New York State Bar Association's public health committee recommends passage of a law enabling drug addicts to receive certain narcotics from public health clinics or registered physicians as a means of breaking criminal drug traffic. Heroin would remain outlawed.

« »

A \$7 million 640-unit housing facility for elderly persons is to be constructed with FHA financing in a Las Vegas, Nev., suburb by Senior Citizens Retreat, Inc., an organization sponsored by officers and members of Painters Local 159.

Plans for the 80-acre plot include a 6-story structure of 100 units surrounded by 1- and 2-story facilities of 20-units each. Dining rooms (public and private), lounges, a swimming pool, 9-hole golf course, shuffleboard, bowling, a hobby shop, library, and chapel are a part of the blueprints.

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The National Library of Medicine has copied the files of *Public Health Reports*, from 1878 to the present, on microfilm.

« »

About 2,000 persons under 21 years of age are "de-labeled" annually of an erroneously diagnosed heart condition by New York City's six cardiac consultation clinics, Dr. Harold Jacobziner, director of maternal and child health services, reports. He added that many remain trapped in the belief of a physical disability because of a physician's earlier misdiagnosis of an innocent heart murmur.

Of 30,252 cancer patients cataloged by the Tumor Registry of the Connecticut Department of Public Health, 10,556 people have lived 5 years or more with their cancer in check, 4,356 for 10 years or more, and 1,672 for 15 years or more.

« »

A department of virology has been established on the Berkeley campus of the University of California. It is one of the first departments in any university of the world to be dedicated to the study of viruses. Biologists, chemists, and physicists will receive intensive specialized instruction in the biochemical, biological, and biophysical aspects of virology.

« »

Regulations on drug handling in licensed nursing homes were circularized to all Indiana pharmacists and wholesale druggists by the State's division of foods and drugs. Pharmacists and wholesalers requested the service.

One requirement of the regulations is a legitimate prescription bearing the patient's name. A program of inspection and licensing of nursing homes in the State is being carried out by an especially trained field staff.

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Pennsylvania's secretary of health, Dr. Charles L. Wilbar, Jr., has ordered Glyco Chemical Corporation of Williamsport to stop discharge of cyanide wastes from its plant into a tributary of the Susquehanna River. Dr. Wilbar's action was ratified by the Sanitary Water Board of the State.

Scientific writers will find guidelines for pamphlet preparation in "Pamphlets, How to Write and Print Them," by Alexander L. Crosby, published by the National Publicity Council for Health and Welfare Services, Inc., 257 Fourth Avenue, New York 10, N.Y.

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A new city health code was enacted in March 1959 by the New York City Board of Health. It will become effective October 1.

The code, the result of work in progress for 3½ years, is divided into five titles: general powers of the department of health; communicable disease control; maternal, infant, child, and school health; environmental sanitation; and records and vital statistics.

Deleted are obsolete provisions such as the requirement that barber-shops, hair dressing and beauty parlors provide cuspidors, and the responsibility of the department to mark the location of dead horses on city streets by placing lighted lamps at their heads at twilight.

Added responsibilities under the new code are control over radioactive materials and X-ray machines, chemical food additives, medical laboratories, and day care centers for children.

Dr. Leona Baumgartner, the city commissioner of health, commented: "The old code was bacteriologically oriented. We realize now more than we did 45 years ago that our environment is more than bacteria. The new one continues the safeguards and broadens the scope to protect us against other hazards."

« »

One-half of the accidents which put farm residents in the hospital occur in farmyards with children the most frequent victims, it was found by the accident prevention program of the Saskatchewan Department of Public Health, Canada. This finding launched a "safe play areas for farm children" project. Farmers are being supplied with do-it-yourself blueprints of simple and safe play equipment which they can make during winter months.

modities complementary to health services, for example, eyeglasses and hearing aids, identify special costs connected with some conditions.

5. Number and income of providers of services whose specialty relates to a disease category, such as psychiatrists and ophthalmologists, are indicators of special costs.

6. Expenditures under public and private agency programs earmarked for services, research, or prevention in a special disease category provide a source of costs.

7. Allocation of "overhead" costs, such as costs of training health personnel and construction of facilities, to a disease category can be based on some index of relative importance like number and use of personnel and facilities.

There are several possible methods of combining these approaches. Expenditures can be classified in terms of who pays the bills, either initially or ultimately. Much of the information now available on aggregate health expenditures in the United States is classified in this way: by expenditures of Federal, State, and local official agencies, insurance carriers, employers, and private persons (5, 7). Another classification is by the category of services purchased, for example, dental or hospital (8, 9). A third classification is by age group of patient. Recently, a World Health Organization study suggested still another type of classification based on a rough index of the physical status of the patient, that is, whether the patient is in a hospital, is ambulatory, or is at home on his back (10). In each of these classifications, preventive services may be distinguished from curative services, and current outlays from capital outlays for plant and physical facilities.

Sources of data for estimating the resources consumed by a specific disease vary by the nature of the disease, the identification of medical specialties and special hospitals with the disease problem, and the extent of identifiable public and private support for the agency program. Some of the source data represent national compilations of statistics on facets of expenditures, but for the most part the materials must be drawn from special regional or community studies. References to such special studies are compiled by the clearinghouse on morbidity projects of the Public Health Service (11) and by the Health Information Foundation (12). Detailing each source of data for estimates on expenditures for specific disease categories is

outside the scope of this paper. The general types of source data, however, are as follows:

Public hospital expenditures. Data on mental hospitals are compiled annually by the National Institute of Mental Health, Public Health Service (13); expenditures on tuberculosis hospitals and tuberculosis control are compiled by the Bureau of State Services, Public Health Service (14). In some communities, information has been tabulated on public hospital use by diagnosis, for example, morbidity in New York City's municipal hospitals (15). Similar material on Federal hospital use by diagnosis is brought together by the Veterans Administration, the Public Health Service, and the Defense Department and is being collected as a byproduct of the administration of the medical care program for dependents of the uniformed services.

Other public expenditures. Data are available on research and related training expenditures for specific disease categories for which separate appropriations are made by the Congress. These amounts are published as part of the U.S. budget and also in the reports of the National Institutes of Health (16).

Household surveys of health service costs per illness case. A number of special household surveys have been made on the nature of illness in population groups, including medical services received and cost of such services. The North Carolina Agricultural Experiment Station, for example, has made such a study from samples of population in Stokes and Montgomery Counties, N.C. (17). The Research Council for Economic Security has studied the volume of prolonged nonoccupational illness among 400,000 employees in private nonagricultural employment, and the types and cost of treatment (18); a survey in Lyon County, Kans., included data on amount and types of different health services as well as costs of hospitalization and cause of hospital care (19); and the Kansas City regional health and hospital survey also included information on both health services and conditions reported (20).

Surveys of patients. A number of different types of sample surveys have been made of persons in hospitals or other institutions and of physicians' patient loads which include, along with diagnostic information, data on use

fined into three types: The first is actual use of economic resources (manpower and materials) for prevention, diagnosis, treatment, and rehabilitation. This represents the direct price of health programs; it is measured by actual expenditures, both public and private, for health services and their complement of commodities and facilities. In the absence of disease, these expenditures would not be necessary. The second type consists of transfers (of resources or of income) which arise out of mitigating the burdens of sickness. Costs in this category do not, in the first instance, affect the total resources used up by sickness in the economy as a whole, but they do affect the distribution of resources among individuals or families. Many of these transfers are designed to mitigate the impact on family income of losses due to death or disability. The third type, less clearly defined but perhaps more pervasive in effect than either of the other two, is loss of resources occasioned by sickness—human resources lost or impaired as a result of death, disability, and debility caused by sickness.

For convenience, we will call these three categories of cost resource-use, resource-transfer, and resource-loss. Other classifications have been used. Dr. Raschi Fein, in a recent work for the Joint Commission on Mental Illness and Health, used direct and indirect cost to refer to resource-use and resource-loss respectively. He combined the transfer category with direct costs (3).

Resource Use

Each of the major diseases and disabilities requires the use of manpower and material for prevention, treatment, and rehabilitation. If it were not for disease and injury, these resources of men and material could be used to produce other want-satisfying goods and services. The actual use of these resources in the health industry thus constitutes the type of cost of sickness that we have termed resource-use.

Available estimates suggest that the part of the Nation's manpower and of goods and services produced that is devoted to health care has increased in recent years. In 1929, the Committee on the Costs of Medical Care estimated

health and medical expenditures at \$3.9 billion (4), or 3.8 percent of the gross national product; an estimate by the Social Security Administration for 1957 showed that the health share of the Nation's output had risen to 4.7 percent (5).

The resources directly devoted to the research, prevention, diagnosis, treatment, and rehabilitation in a specific program or disease category are represented by the outlays of public and private health agencies, employers, and individuals and their families. They include expenditures for (a) health services provided by physicians, hospitals, dentists, nurses, and other health personnel; (b) complementary commodities such as drugs, prosthetic appliances, and medical supplies; (c) public health programs, including, for some disease categories, environmental health services; (d) medical research; (e) a part of costs of training health personnel; and (f) a part of capital expenditures for construction of health plant and facilities used in the provision of health services and the production of complementary health goods.

While progress has been made in the development of estimates for global health expenditures which encompass most of these categories of outlays, figures in current use for specific diseases fall far short of even a complete count of expenditures for hospital and physician services, both public and private (2,3,6).

Estimates of expenditures by disease category may be approached and combined from available data in several ways. The following summary of methods consists partly of alternative approaches and partly of methods for approximating additive segments.

1. Data on average cost per case of a disease times number of cases give a rough approximation of total cost of a disease.

2. If the average cost per case is not known, average duration of hospital care, times number of cases, times cost per unit of service, plus average drug use times cost of other health services yields a similar approximation.

3. Expenditures (both current and capital) of hospitals and nursing homes specially designed for a specific disease can indicate the costs, as can the allocation of expenditures of general hospitals (or nursing homes) based on hospital use by diagnosis.

4. Expenditures for specific disease-connected com-

nesses for which data are sought, such as cerebral palsy cases. The Health Information Foundation in its 1952-53 survey attempted to obtain information from the surveyed families on both expenditures and health conditions but the illness data were not tabulated (35). A review of the information obtained by the Bureau of Labor Statistics in its 1950 survey of urban families on the illness for which the major part of the family's medical care expenditures were incurred indicated that the information reported was too sparse to permit analysis by disease category (36).

Another step in obtaining materials for estimates of expenditures by specific disease category would be to gather more information as part of the National Health Survey. A tabulation of information on physician visits and on practical and professional nurse services by nature of condition would make a beginning toward approaching expenditures through volume of services. Other health service items and commodities might be incorporated on the questionnaire for special analysis. Information on number of prescriptions, X-ray services, ambulance services, laboratory tests, oxygen, transfusions, and on physical and occupational therapy services and public health services might be obtained. It would probably be desirable to develop a series of questions on health services used for several major disease categories on a supplement to the general questionnaire for surveyed families.

Other approaches might be followed in the collection of information, such as a sampling of hospital and physician records to define the classes and volumes of services used in the diagnosis and treatment of the major diseases, and the independent collection of price data for the defined classes of health services and commodities used. Collation of public expenditure data for specified disease categories would also facilitate the approximation of aggregate expenditures for a disease. The National Institute of Mental Health has worked toward the collection of costs of mental illness not only by assisting in improved financial reporting from State hospitals but also by bringing together other data on public expenditures for mental patients, but these data combining

Federal and State mental hospital expenditures are not published.

Resource Transfer

Disease and injury occasion not only a direct use of economic resources for the provision of health services and supporting goods but also transfers of income between the sick and the well. These transfers are costs to the givers, benefits to the receivers; but because they entail a reallocation of resources away from uses which, in the absence of sickness, would be preferred, transfers must be considered in assessing the economic impact of disease.

The size and importance of these transfers in the American economy have increased rapidly in the last two decades. They take two principal forms. One consists of payments made directly to the sick and disabled (or their survivors) and financed from taxes or contributions levied; social security protection under public and private auspices is the principal example. The other is the hidden redistribution of the tax burden that comes about through statutory tax provisions designed to assist families and voluntary agencies in meeting problems arising out of sickness. On both these counts, disease takes resources away from those who are well, and who would otherwise have alternative uses for them, and gives them to those who are sick and to survivors.

Cash Payments

A wide range of cash payments are made to individuals to mitigate the effects of loss of income due to death and disability. It is difficult to distinguish transfer payments attributable to sickness alone. For example, a part of old-age assistance and of old-age insurance benefits are paid because the aged person became disabled and was forced to retire. Under Federal programs, payments are provided to disabled veterans, to survivors and the disabled under the old-age, survivors, and disability insurance (OASDI) program, under the Civil Service system, and under the railroad retirement program. Compensation benefits for work connected with injuries are paid to Federal employees and sickness benefits to railroad

of the different classes of health services, or cost of care or treatment. One example is the Dane County, Wis., survey of services and cost of treatment of the aging and long-term patient (21). A nationwide study of all patients discharged in a week in 1956 by hospital use and diagnostic category as well as of physician services received has been made by the Bureau of Medical Economic Research of the American Medical Association (22). A nationwide study is reported to have been made of drug therapies and morbidity reported by physicians based on case records kept on patients seen in private practice during a 2-day period.

Prepayment plan and insurance carrier data. Some compilations have been made of the experience under prepayment plans such as Health Insurance Plan of Greater New York and Kaiser-Permanente indicating volumes of selected health services for different conditions or hours of professional work time involved for different procedures (23-26). Insurance claims data which have been published for special purposes also provide useful materials (27). Fairly detailed data on costs by diagnosis are becoming available in administration of the Medicare program and provide an important source of cost information for the types of conditions to which the Medicare beneficiary group are subject (28).

Census and trade data. For some types of health commodities, such as hearing aids, eyeglasses, and drugs, data are available from the retail, wholesale, and manufacturing censuses conducted by the U.S. Census Bureau and from trade journals such as *American Druggist* and *Drug Topics* (29-31).

Professional income, fees, and hospital rates. The publication *Medical Economics* has put out information from a sample of physicians on gross and net physician income by specialty (32). Fee allowances for specific procedures are set up by Blue Shield plans, Medicare, Veterans Administration, and in the course of administration of other health programs. Hospital charges and costs are available from the publications of the American Hospital Association, regional hospital councils (33), and from public medical care programs. However, these hospital data are not generally classified by disease category.

National Health Survey. Perhaps the most important single source of data by nature of condition or diagnostic category is the National Health Survey (34). From the household surveys, information is being obtained on the condition reported at the time of the interview. In the medical examination survey, information is being obtained on selected conditions for which standard diagnostic procedures have been developed. In both types of surveys, data are being collected on items of medical service use, including hospitalization, physician visits, dental visits, nursing care, and use of specified special aids (hearing aids, artificial limbs, braces, and wheelchairs). Information from the household survey on numbers of days of hospital care and average length of hospital stay have been published for specified hospitalized conditions including malignant neoplasms, heart diseases, arthritis, hernia, fractures and dislocations, and infective and parasitic diseases. Dental visits have been published by type of services received. Other types of services have not been related thus far to the nature of the condition reported.

The various estimates that have been compiled of resources devoted to health services and related commodities on account of specific diseases point up the inadequacies of existing information on which such estimates are based. Additional collection of expenditure data cross-classified by nature of illness is needed.

The problems of collecting information of this type are many. Household surveys are limited by the types of conditions that families are likely to report, and by the undercount of expenditures for terminal cases. Many household surveys omit institutional populations. In addition, with the increase in voluntary health insurance coverage, expenditures for services are paid by the insurance plans and families often have no record of these costs. Other more technical problems include the use of health services and drugs for multiple conditions, the difficulties of obtaining accurate reporting on relatively small expenditure items, and memory biases in reports from households in which detailed expenditure records are not kept.

Small sample studies, moreover, yield an inadequate number of cases on many of the ill-

nesses for which data are sought, such as cerebral palsy cases. The Health Information Foundation in its 1952-53 survey attempted to obtain information from the surveyed families on both expenditures and health conditions but the illness data were not tabulated (35). A review of the information obtained by the Bureau of Labor Statistics in its 1950 survey of urban families on the illness for which the major part of the family's medical care expenditures were incurred indicated that the information reported was too sparse to permit analysis by disease category (36).

Another step in obtaining materials for estimates of expenditures by specific disease category would be to gather more information as part of the National Health Survey. A tabulation of information on physician visits and on practical and professional nurse services by nature of condition would make a beginning toward approaching expenditures through volume of services. Other health service items and commodities might be incorporated on the questionnaire for special analysis. Information on number of prescriptions, X-ray services, ambulance services, laboratory tests, oxygen, transfusions, and on physical and occupational therapy services and public health services might be obtained. It would probably be desirable to develop a series of questions on health services used for several major disease categories on a supplement to the general questionnaire for surveyed families.

Other approaches might be followed in the collection of information, such as a sampling of hospital and physician records to define the classes and volumes of services used in the diagnosis and treatment of the major diseases, and the independent collection of price data for the defined classes of health services and commodities used. Collation of public expenditure data for specified disease categories would also facilitate the approximation of aggregate expenditures for a disease. The National Institute of Mental Health has worked toward the collection of costs of mental illness not only by assisting in improved financial reporting from State hospitals but also by bringing together other data on public expenditures for mental patients, but these data combining

Federal and State mental hospital expenditures are not published.

Resource Transfer

Disease and injury occasion not only a direct use of economic resources for the provision of health services and supporting goods but also transfers of income between the sick and the well. These transfers are costs to the givers, benefits to the receivers; but because they entail a reallocation of resources away from uses which, in the absence of sickness, would be preferred, transfers must be considered in assessing the economic impact of disease.

The size and importance of these transfers in the American economy have increased rapidly in the last two decades. They take two principal forms. One consists of payments made directly to the sick and disabled (or their survivors) and financed from taxes or contributions levied; social security protection under public and private auspices is the principal example. The other is the hidden redistribution of the tax burden that comes about through statutory tax provisions designed to assist families and voluntary agencies in meeting problems arising out of sickness. On both these counts, disease takes resources away from those who are well, and who would otherwise have alternative uses for them, and gives them to those who are sick and to survivors.

Cash Payments

A wide range of cash payments are made to individuals to mitigate the effects of loss of income due to death and disability. It is difficult to distinguish transfer payments attributable to sickness alone. For example, a part of old-age assistance and of old-age insurance benefits are paid because the aged person became disabled and was forced to retire. Under Federal programs, payments are provided to disabled veterans, to survivors and the disabled under the old-age, survivors, and disability insurance (OASDI) program, under the Civil Service system, and under the railroad retirement program. Compensation benefits for work connected with injuries are paid to Federal employees and sickness benefits to railroad

workers. In cooperation with the States, the Federal Government finances payments to the needy blind, disabled, and aged. Under State and local laws sizable cash payments are made to families whose income has been impaired by sickness. These cash payments include workmen's compensation benefits, cash sickness benefits (in four States), benefits under State and local retirement systems, and a part of the general assistance caseload as well.

Figures on these public outlays are available, and give some idea of the magnitude of resource-transfer under public auspices that occurs in our economy as a result of sickness. Disability payments under social insurance and related programs alone total more than \$3.5 billion at the present time (37). Aid to the needy blind and disabled under the assistance program accounts for an additional \$340 million per annum (38).

Private health, sickness, and disability plans have reached major proportions, but data in this area are piecemeal and often incomplete. In 1957, employer contributions to private pension and welfare plans totaled \$7 billion (9). Alfred M. Skolnik, of the Social Security Administration, has estimated premiums paid under group cash sickness insurance plans alone at \$134.5 million. A survey of 3,100 firms employing 6.8 million persons made by the National Industrial Conference Board found that 85 percent of hourly workers and 75 percent of salaried workers were covered under group accident and sickness insurance (39); the benefits for slightly under half of these employees were paid for entirely by the employers, and in almost all the remainder the employers contributed substantially.

Current practice in national income accounting does not define employer contributions to disability, cash sickness, and life insurance plans as transfer of income. They are regarded as supplements to wages and salaries, thus as part of the current return for productive services given. These contributions, however, are essentially pooled and go to finance payments to survivors and to those who are sick or disabled. The benefit payments accordingly represent from our point of view not an addition to national output but a shift in the shares of the national output from all workers cov-

ered to those whose income is impaired by death and disease. However, if sickness were miraculously eliminated it may be assumed that these employer payments would go instead directly into wages and salary compensation for the services.

Data on total benefits for each of the various types of protection are piecemeal and incomplete. For specific disease categories, they are even less adequate. Under the OASDI program, data are available on the number of beneficiaries by disability group and primary diagnosis, although amounts paid are not tabulated in this way (40). Benefits paid to disabled veterans, by broad disease categories, are included in the Annual Report of the Administrator of Veterans Affairs (41), but more detailed figures are not published. Benefits paid under State workmen's compensation programs are not recorded on a national basis, but some States publish data by diagnostic category. Some studies of State temporary disability insurance programs provide information on benefits paid by cause of disability (42).

Hidden Subsidies

The tax structure is increasingly being used to foster redistribution of income in the interests of specific public program ends. This amounts to a form of hidden subsidy. Under National, State, and local statutes there are a wide variety of exclusions, exemptions, deductions, and allowances made for reducing the costs of operating health facilities, for stimulating private giving, for reducing the burden of taxation on families incurring sickness and disability. For every deduction, or equivalent means of reducing the tax on those who are sick, there must be a corresponding increase in some other tax source to maintain a given level of revenue. Tax relief for some groups, for example those who are sick, means larger tax burdens for others. The losses in revenue from those who contribute to health agencies, who take deductions allowed for medical expenses, or who deduct income received as sick pay must be made up in the form of higher tax rates or additional tax levies. This shift in tax burden represents a shift in income after taxes and in the distribution of funds available for consumption among families.

Estimates of the magnitude of resources transferred in this indirect way are naturally lacking in precision. Some illustrative magnitudes may be suggested. Deductions from income on account of medical expense amounted to \$3.5 billion in 1956, the latest year for which data are available (43). Sick leave pay and cash sickness benefits deducted from income amounted to \$1.4 billion (43).

A large part of these costs appear again either as resource-use or resource-loss. The hidden transfers are not generally additive to these other types of cost because they do not represent a change in the total cost to the community as a whole; they represent rather a shift in command over income within the community. Similarly, cash transfer payments in large part represent payments made to individuals and families to partially compensate them for a loss in earnings represented more fully in the estimates of loss in labor product due to deaths and disabilities. Cash transfers included in the resource-loss estimates are not an additional cost item; where they are added there is a double counting (3). However, in the absence of estimates of resource-loss, cash transfer payments as a partial measure of income loss attributable to a disease may be added to resource-use.

Resource Loss

The type of sickness cost we have categorized as resource-use relates to the way in which existing economic resources are diverted to the sector of the economy that produces health services. Without sickness and injury, these health services would be unnecessary and the resources would be free for other productive uses. Resource-transfer represents shifts in command over resources between persons or groups, which may be direct costs to one sector of the economy but are of benefit to another. However, sickness and injury also affect the quantity of resources available in the first place. Disease and impairments cause a loss of economic resources, a loss that would cease if disease and injury were to be eliminated. This is also part of the total economic cost of sickness.

The resource lost as a result of sickness is human labor. In order to value the loss in dollars, it is necessary to estimate the output

foregone. The question is, if there were no sickness how much would those persons who are now sick have produced?

The effects of sickness upon the amount of human labor available for productive purposes can be summarized under three heads: deaths (loss of workers), disability (loss of working time); and debility (loss of productive capacity while at work).

Essentially, there are two stages in calculating the output foregone: (a) estimating the loss in productive work time, and (b) assigning a money value to the output that this lost work time represents. The result is then a dollar figure which represents the value of the loss in output attributable to deaths, disability, and debility. In other words, it is a rough estimate of the increase in output that would occur if the loss of resources due to sickness were eliminated.

In view of the conceptual difficulty of the idea of resource-loss, we will explain the problems involved in arriving at an estimate at somewhat greater length than we have done for resource-use and resource-transfer.

Conceptual Problems

An estimate of work-loss due to a disease involves the assumption that, if it were not for the disease, those persons in the productive age groups stricken by the disease would have been employed. In fact, where there is unemployment or substantial underemployment, improved health may result in more unemployment rather than more output. One obvious reason for using the simplifying assumption of full employment is that unless we do so we cannot arrive at any definite concept of what the resource-loss is. Apart from this, however, the fact that production losses resulting from poor health cannot be realized in an unemployment situation should be attributed to unemployment, not to ill health. Unemployment has its own costs which in effect may cancel out reductions in the costs of sickness, but for analytical purposes it is valuable to distinguish between the two. We, therefore, measure the costs of disease in the assumed absence of costs of unemployment, recognizing, however, that unemployment itself may have an impact on the incidence of illness (44).

There is another assumption implicit in the view that loss in production due to death, disability, and debility can be attributed to a particular disease. This is that the persons who die from or are disabled by the disease would otherwise be in good health. Here again, it is possible that persons saved from one disease may promptly die of another, and their production thus be lost in any case. It seems reasonable enough to disregard this possibility for clearly defined diseases that strike primarily at persons of working age; but it is less reasonable for cases where the disease, or treatment required to overcome it, weakens the patient by making him more prone to other ailments, and for cases when the disease strikes mainly at persons who are constitutionally weak in any case, as with the diseases of old age. In these cases, the loss in production can less clearly be identified with the effects of one disease. The result of disregarding the presence of multiple diseases is an overestimate of the cost of any single disease. At some later stage in refinement of the concept of disease cost, a methodology must be developed to deal with this problem.

Moreover, the assumption that side effects of other diseases may be disregarded in order to measure the direct effects of the disease in question means that the indirect costs of each disease, taken individually, cannot be added together to make a meaningful total for all diseases. Conceptually, such a summation could be made only if all alternatives to every disease were eliminated, in which case there would be nothing to sum. This problem illustrates the difficulty in applying the concept of resource-loss, as we are describing it here, to sickness as a whole.

The time scale of any estimate of resource-loss due to sickness involves further problems. Conceptually, it is possible to view the loss in production as (a) the loss in a given time period (for example, 1 year), (b) the loss over a productive work life.

The first of these seems most relevant to the present discussion because it is most nearly comparable to the types of estimates of resource-use and resource-transfer described earlier. It should be recognized, however, that death and permanent disability this year have a continu-

ing cost in terms of productive resources lost in the years that follow. Cost studies by Weisbrod (cancer, poliomyelitis, and tuberculosis), Malzburg (mental illness), Reynolds (road accidents) and Laitin (cancer) relate their estimates to the second of these concepts, the loss over a productive work life (45-48); the Fein study on the cost of mental illness developed 1-year estimates as well (3). The emphasis upon the lifetime estimate is perhaps due to the far-reaching influence of Dublin and Lotka's "Money Value of a Man," which presented an actuarial approach to this problem; but the authors of this work recognized that their method might not be applicable to the economy as a whole; it was intended originally to value a life for indemnity purposes only (49).

The 1-year estimate is conceptually much simpler, involves fewer assumptions, and in addition yields the most conservative estimate of resource-loss; for these reasons, we feel it to be the most appropriate measure in this context. The difference in estimates derived by these alternative approaches will not be so great as might appear at first, because (a) the appropriate disability figure in the case of a single-period estimate is that of disease prevalence, whereas in the case of a lifetime estimate it must be disease incidence, and (b) a rapidly diminishing value is attributed to future output in the process of placing a present value on these future earnings. Different interest rates assumed will affect the rapidity of the decrease as illustrated by the Weisbrod study which used alternatively interest rates of 4 and 10 percent—these being based respectively on the cost of long-term Government borrowing and the rate of return on corporate taxes (45). Conceptually the two types of estimates—for a single year and over a lifespan—must be regarded, however, as distinctly different.

There has been suggested earlier a threefold classification of resource-loss: losses from death, disability, and debility. In practice, these categories need closer definition, and it may be necessary to subdivide them further to make them correspond to available data.

Death is unambiguous in meaning, but cause of death is sometimes not. In estimates of resource-loss caused by a particular disease, deaths from multiple causes may need to be treated

differently from those caused by the disease in question alone. Disability caused by sickness may be partial or total, and it may be short term or long term. Cases of long-term disability, especially when total, may be found primarily in institutions, and thus it may be convenient to subclassify again into institutional and noninstitutional populations and use data available on institutional cases to measure a part of the disability caseload. The division between disability and debility, furthermore, will not be clearcut in many cases.

Loss of Working Time

The loss in resources through death, disability, and debility must, for the first stage of the estimate, be stated in terms of units of productive work time lost. The second stage to be dealt with later is to assign a value to these units. In the case of death and long-term disability, these units of work time are lost because of subtractions from the productive work force. With short-term disability, the loss will take the form of periods of lost time from the job and these may be converted into equivalent units of full-time work lost. Debility, defined as reduced productive efficiency per man, too may be converted into full-time equivalents. For convenience, the following discussion will refer to man-years as the units of productive work time.

How the equivalent of the full-time work force is defined operatively is of central importance to the estimate. For purposes of a single-year estimate, for example, a decision must be made on the age limits within which persons who contract disease will be considered as productive workers. In the United States, the age of entry into the work force is usually considered as 14 years. This starting age is largely a historical carryover in definition which has been perpetuated for comparative purposes in spite of the trend toward later entry into the work force. The retirement age varies widely among different groups and in different areas; the average age of retirement for the United States is estimated at present at 68 years of age for men (50).

The consequence of this limitation of work-force participation, for a single-period esti-

mate, is to count the resource-loss from death, disability, and debility of the young and retired aged as zero. This is consistent with the definition, since persons outside the work force are not considered to contribute anything to production in the year in question. For the extended time-scale analysis, however, infant and childhood deaths represent a future loss to society and must be allowed for, although the time interval between death and anticipated entry into the work force may be such that the present value of the future loss of working time is small.

The importance of the retirement-age assumption will vary with different social and economic settings. In some economies, the urgency of production for survival leaves little room for retirement prior to death or total disability; with higher productivity and industrial advances, cessation of work activity becomes feasible before extreme old age is reached. In an industrial community, therefore, it seems reasonable to exclude retired persons who cease to contribute to production, but in others retirement may be disregarded.

Whatever age limitations are set upon the productive work force, further qualification is necessary because not all persons of productive age are actually engaged in production. At full employment, only a certain proportion of the members of each age group will be productively employed, and the loss in man-years attributable to these persons alone should be counted toward the estimate of resource-loss. Here again, this implies that the death or disability of a person not in the active work force occasions no loss of productive resources.

Special problems arise in the case of women working in the home. Such women are not normally included in standard definitions of the work force, and their product, unlike that of paid domestic workers, is not included in the national economic accounts. Thus defined, their death or disability is not an economic cost. However, this is clearly highly anomalous; it implies that the national product is increased if every wife does housework for pay for the family next door, and lowered if every man marries his cook. The only alternative is to impute some value to the services of housewives in the home, thus imputing an indirect cost to their

death or disability. Although proposals have been advanced for broadening the concept of production used for national product purposes to include such nonmarket services, no generally agreed way to do so at present exists (51). To simplify the estimate and to follow an approach consistent with national product accounting it seems desirable at this stage of analysis to omit the valuation of housewife services.

A related problem concerns the method of counting deaths and disabilities among unpaid family workers. In the United States and several other countries, unpaid family work is included in the national product accounts, in effect requiring a prorating of income among the working members of the family enterprise. In this case, there is a basis for allocating a value to the services of such a worker. The importance of this problem obviously varies in different social settings, but in countries where a large proportion of production is carried on on farms and in other family enterprises it would be clearly advisable to count deaths and disabilities among those who work within the family unit without money wages.

In estimates over a lifespan, work life tables developed by the Bureau of Labor Statistics may be applied which identify the remaining years of work life at each age group. Estimates of work life years have been developed for 1940 and 1950 for both men and women; and historical changes in the pattern of work life expectancies have been estimated for 1900 and projected to the year 2000 (52-54).

Further problems arise in connection with part-time workers. The loss of productive work time for a given impact of disease among these persons will be less than that among full-time workers, and this loss will have to be converted to a full-time equivalent for purposes of the estimate. The effect will be to consider the loss of, say, two part-time workers as being equivalent to that of one full-time worker; the exact ratio might be determined with reference to average hours of work or other available criteria.

The most practical solution to these definitional problems may be to use existing concepts of "work force" and "labor force" (converted to full-time equivalents) to distinguish the cases of the disease that result in actual loss of pro-

ductive work time. In the United States, the basis for classifying persons in or out of the "labor force" is their activity during a specified week. Employed members of the labor force comprise those at work for pay or profit during the survey week, those who worked without pay for more than 15 hours on farms or in family businesses, and those who would have been in these two categories in the work force but for vacation, temporary illness, bad weather, or industrial disputes. Unemployed members of the labor force comprise all those without work who were actively seeking work during the survey week. Data will often be available only within this framework, and this method has the further advantage that it makes the estimate of resource-loss comparable in scope with existing national product estimates. The effect, however, is to exclude almost all the nonmarket costs of death, disability, and debility from our estimate of resource-loss, and this should be clearly recognized as a serious source of understatement of the total.

Our measure of resource-loss is posited on the assumption of full employment. However, it may be felt desirable to make an allowance for frictional unemployment, that is, the essential unemployment that exists even at full-employment levels as when persons change jobs or are temporarily laid off. In the United States, this is usually considered to run at about 3 percent of the labor force at any time; thus 3 percent fewer deaths and disabilities than the total of those from the labor force actually affect production at any time. It is also desirable to allow for absenteeism over-employment, which is normal absenteeism of workers from jobs because of vacations, bad weather, and temporary sickness. These adjustments may be applied to the final estimate of productive work time lost due to the disease as a straight percentage reduction, or in terms of a full-time equivalent number of man-years.

It is apparent even from this brief discussion of the problems of defining lost work time due to disease that many of the factors involved are dynamic. The single-period type of estimate, which sets out to quantify the gain in work time in a given year that would result if a specific disease were eliminated, avoids the problems of estimating future trends in work-force partici-

pation. For the lifespan type of estimate, these problems could only be solved by making a large number of assumptions about the future course of such trends, and the uncertainty and complexity of the estimate would be greatly increased.

Loss of Output

The previous stage in the computation has resulted in an estimate of the productive man-years lost because of deaths, disability, and debility from sickness. This, in itself, may prove a useful piece of political arithmetic, but in most cases it will be desirable to translate this into dollar cost by assigning a value to the man-years foregone in terms of lost production.

In the available studies on losses from illness, two essentially divergent approaches have been used in assigning a value to each unit of labor work time. The first is to value each unit by an amount equivalent to total product per worker; the other is to use earnings as a measure of labor product per worker.

The first of these assumes, as Fein (3) has indicated, ". . . that all of the national product (income), and therefore any gains in national product, are attributable to labor rather than to some combination of joint factors of production, land, labor, capital, etc. Although it may, indeed, be true that if there were no labor there would be no product, it is equally true that if there were no capital there would be very little product."

The total-product-per-worker approach was used by Reynolds in his study of the cost of road accidents in Great Britain (47) and also in the National Planning Association study on the costs of tuberculosis in the United States (55).

The second alternative—to use earnings as a measure of the output attributable to labor—seems to us to be more appropriate for purposes of estimating resource-loss. Earnings, in this case, must be distinguished from income, which includes returns on property or capital; earnings consist only of wages and salaries (or equivalents for the self-employed). These wages and salaries are paid in direct return for productive services, and, according to economic theory, they correspond to the individual's contribution to production. The estimate of re-

source-loss put in these terms thus measures the loss of production attributable to labor which this earnings-loss represents.

A choice between these two alternatives arises also in estimates of the costs of unemployment, which are perhaps more familiar than those of the costs of disease. Here, however, gross product per worker seems the more appropriate concept, because it is fair to assume in these circumstances that some capital will be unemployed along with labor. This brings to light another assumption implicit in our concept of resource-loss from a disease: this is that the ratio of investment of capital to labor used remains approximately constant. If this were not so (as, for example, if the investment or capital stock were assumed to be constant and unchanging), the labor released by eliminating the disease might have to work with less capital per capita, and diminishing marginal returns to labor would ensue. A related implicit assumption is that the capital stock is infinitely divisible, so that there is no question of the product of each man being tied to the availability of a machine or implement.

The earnings figure used may be an average for all employed workers. This assumes that the average earnings pattern among those who contract the disease is the same as that of the working population at large. For greater accuracy, it would be preferable to use a series of averages applied to sex-age groups, occupational categories, or other subdivisions and to take account of the findings of studies relating earning levels and disease incidence.

The use of average earnings per full-time employed worker is in fact only an approximation of marginal earnings, which are needed to actually measure the additional labor product that would become available as a result of eliminating the disease. Under the assumptions of full employment of labor and constant labor-capital ratio that we have made, average and marginal earnings will be the same. In practice, however, if elimination of the disease were to throw a relatively large number of workers onto the labor market, it might be found that these assumptions would need to be relaxed for purposes of realistic prediction.

A word must be added about an argument

appearing sometimes in the literature (49) that a man's contribution to production should be considered net, exclusive of the essential consumption required to maintain him as a producer, rather than gross as we have taken it here. Quite apart from the virtually insoluble difficulty of defining "essential" consumption, the frame of reference of our problem is to determine the loss in total output caused by disease and thus by definition the gross approach is indicated. The fact that saving a life adds a consumer as well as a producer to the economic process is immaterial to an estimate of change in total output. Calculation of the resulting change in consumption levels per capita is basically a problem of resource-use rather than losses in production.

Average earnings multiplied by the number of man-years lost as a result of the disease yields the dollar estimate of resource-loss caused by a disease. We are now in a position to define the result more closely. It is, essentially, an estimate of the money value of the labor product lost as a result of death, disability, and debility due to a disease.

Gaps in Statistical Data

The foregoing summary of concepts and definitions in the measurement of output-loss due to a disease suggests the wide range of assumptions and approximations which must sometimes take the place of factual information in estimating the dollar amounts.

Statistics on employment patterns are applied to data on deaths by cause, age, and sex without taking account of the specific employment history of those who die. The assumption of average work-force participation is made necessary by the absence of specific information on employment status of the deceased. In fact, there will be differences in the importance to productivity of each death: elimination of a key worker in a basic industry, for example, might affect the ultimate output of hundreds of others.

Estimates of average full-time earnings are applied to deaths in the productive age groups without taking into account the differential death rates in different industries and occupations, which may pay different wages. The absence of recent data on deaths by occupa-

tional groups and by earnings classes necessitate the use of average figures.

Improvement of the estimates now in current use of the resource-loss due to deaths not only requires agreement on concepts and definitions for measurement, but also additional data on mortality by cause of death, relation of the deceased to the work force in a period preceding death, and occupation and earnings in a period prior to death.

Data on work-loss days for those attached to the work force have become available through the U.S. National Health Survey of the Public Health Service. These data, however, are published only for the following groups of conditions: infectious and parasitic, circulatory, respiratory, digestive, genitourinary, arthritic and rheumatic, injury and impairment due to injuries, other impairments, and all other conditions. Until such data become available for more specific disease categories, information on disease prevalence and on duration of illness will be combined with average work-force participation for age and sex groups to approximate the work-loss days. Moreover, data are needed on usual earnings rates received by persons reporting work loss due to a condition. The existence of multiple conditions yields an inflated count of work loss attributable to each condition and an overcount of the sum of days for more than one condition.

The impact of diseases which cause debility, or loss of working efficiency, is no simple matter to define. In its broadest dimension, a measure of loss of output due to disease debility requires formulation of a standard of output in the absence of the disease, from which shortcomings may be measured. Additional work is required on the concept of measurement, as well as on the collection of data permitting a count of lost product per unit of work time. In highly industrialized countries, machines have taken over much of the physical work of man, and maximum demands are seldom made upon the physical energy of the average worker in the mechanized industries. What, however, are the appropriate counts of maximum output in terms of human capacity in service and nonmechanized employment and of deviations from these maximums? In other economic settings, the energy capacity of a man at work may be of

great importance. In subsistence agriculture, reduction in debility from malaria, trachoma, or dysentery can be as important a factor in increasing productivity as a change in tools or technology.

Debility, where relevant, thus represents the least well defined of the three categories through which we examine the resource-loss from disease. However, its influence is so pervasive that some basis for estimating its impact on the economy is badly needed.

Conclusions

To summarize, the economic costs of disease and injury are of three types: (a) costs which use a share of the Nation's resources of manpower and materials to supply health services and their commodity components; (b) costs represented by the transfer of income and resources from the well to the sick in public and private efforts to mitigate the burdens of illness; (c) costs reflected in a reduced national production of all goods and services. These three types of costs are termed resource-use, resource-transfer, and resource-loss.

The price of control of a disease is the health resources used up in the treatment and control of a disease. In economies characterized by severely limited resources and low food supplies, there must be added the minimum essential consumption of people whose lives are saved by the successful disease control action.

The economic cost of a disease for price-cost comparisons is the loss in labor product, or the amount by which the national output in a year is reduced by death, disability, and debility.

The omissions and limitations of this type of economic arithmetic are many. The scheme fails to take into account the pervasive force for social and economic change released by improvement in mortality rates and changes in expectations of survival. Changes in life expectancy and in health status radically alter attitudes toward work and enterprise. Disease and early death are deeply implanted in the mores of many people of the world. The fears, superstitions, rigid social patterns, and resistance to change are in part cultural adjustments to high disease and death rates. While they are not to be changed overnight, one cause of

them will be removed when illness is limited and death rates sharply reduced.

Changes in expectation of life, moreover, alter individual attitudes toward sacrifice of some part of today's consumption for tomorrow's. The time perspective of planning and investment for economic development is deeply affected by health levels. A prospect of longer life disposes the individual to support long-run development projects because he sees for himself a better chance of reaping some of their benefits. Changes in life expectancy, especially of infants and children, offer some promise of adjustment, over a period of time, in size of family, fertility rates, and age structure of the population.

The accounting of economic gains and losses as described also omits what is perhaps the simplest and most direct economic effect of all. Health is itself an element in the standard of living. Concentration on health as an investment in economic resources—an intermediate product of value in that it helps to increase national output—must not obscure its parallel importance as a final product for human welfare.

Objection on ethical grounds has sometimes been raised to conversion of human lives to money terms, to the disregarding of human suffering and to the counting of saved lives of children and other nonproducers as a price rather than gain. The value of human life and relief of suffering obviously cannot be disregarded in health programing. Disease prevention and control measures which yield zero or even negative economic returns can be fully justified in terms of human values. The fact that the economic arithmetic of a disease is only one of a number of tools for evaluation of health programs does not in itself argue against development of cost estimates of disease.

Voluntary and public agencies concerned with specific diseases have developed or used such estimates to further programs of medical research and disease control. They have financed studies of these costs to give them a tool to describe the size of the problem in public discussion. Review of these studies indicates clearly the need for development of a conceptual framework for such estimates, for a clearer formulation of their assumptions and limita-

tions, and for indication of the areas in which relevant data still need to be collected.

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ADVANCES IN PATHOLOGY

CONFERENCE REPORT

THE TRANSPLANT of human leprosy into animals, a new technique to detect cancer cells, a reevaluation of Buerger's disease, and an explanation of some causes of sudden death were announced at the annual meetings of the International Academy of Pathology and the American Association of Pathologists and Bacteriologists held April 20-25, 1959, in Boston, Mass.

Transplant of Human Leprosy

Experiments that appear to have achieved the long-sought goal of transplanting human leprosy into animals were reported by Dr. Chapman H. Binford, Public Health Service officer on duty with the Armed Forces Institute of Pathology, Washington, D.C.

In the experiments bacilli from skin specimens of leprosy patients were inoculated into 2 sets of 50 golden hamsters each, Dr. Binford said. Infections paralleling those of human leprosy in tissue pattern, number of bacteria within cells, and presence of bacteria within nerves appeared in the hamsters in the 18 months following inoculation.

Bacilli from these animals were then injected into a second group of hamsters, and in 5 months an infection that resembled leprosy again appeared. Bacilli from that group have been transferred to a third set of hamsters with apparently successful results.

The golden hamsters were inoculated in their ears and testes. The temperatures of these sites are lower than those of other regions of the body, and the micro-organism *Mycobacterium leprae* in man is known to prefer low-temperature regions.

One group of hamsters in each experiment was given injections of heat-killed bacilli as a control measure. None developed infections. During the 3-year investigation, 35 different inoculation experiments were tried in more than 1,500 small animals. Inoculation was unsuccessful in guinea pigs, albino hamsters, white rats, white mice, hairless mice, and monkeys.

The research was a joint effort by the Laboratory Branch, Communicable Disease Center, Public Health Service, at Chamblee, Ga., the Armed Forces Institute of Pathology, and the Leprosy Registry, American Registry of Pathology, of Washington, D.C.

Dr. Binford emphasized that the results of the experiments must be viewed with caution and confirmed by repetition. He hopes that other researchers will try to reproduce his results.

During the 85 years since Dr. Gerhard Hansen discovered the leprosy bacillus, claims of successful culture of the bacteria in laboratories and production of the disease in animals have been made and later disproved. Verification of results is difficult because there is no laboratory method for positively identifying the bacillus.

Inability to grow *M. leprae* on artificial media or to infect laboratory animals has hindered research on leprosy. If stable, regularly reproducible lesions due to the leprosy bacillus are acceptably established in the hamster or other animals, many objective studies of leprosy can be undertaken in research laboratories. Among these would be search for more effective treatment, experiments in transmission, exploration of immunological processes, and renewed investigations in bacteriology.

Cancer Cell Detection

By employing a fluorescent orange dye, pathologists at Walter Reed Army Hospital have halved the time required to detect cancer cells in smears taken in cytology examinations, stated Capt. Leroy H. Dart, pathology resident, and M. Sgt. Thomas R. Turner, cyto-technologist. They said that 5,491 microscopic preparations stained with the new dye, acridine orange, were examined twice as rapidly and just as accurately as with the Papanicolaou technique.

The technique they reported represents a modification of the acridine orange method introduced by Ludwig von Bertalanffy.

The dye causes nucleic acids present in the cells to give off a green and red fluorescence. Cancerous cells, which contain increased amounts of nucleic acids, show an extremely bright fluorescence under the microscope.

Captain Dart pointed out that the method is used only as a screening examination. When the possible presence of cancer is indicated, final diagnosis is made by microscopic examination of a biopsy specimen. The laboratory service of Walter Reed Army Hospital has adopted the fluorescent dye technique for routine examination of smears.

Buerger's Disease

Buerger's disease may not be a disease entity at all in the opinion of a group of medical investigators associated with Beth Israel Hospital and Harvard Medical School.

The researchers were Dr. Stanford Wessler, associate in medical research at the hospital

and assistant professor of medicine at Harvard; Dr. Si-Chun Ming, senior fellow in pathology at the hospital and clinical associate in pathology at Harvard; Dr. Victor Gurewich, former resident in medicine at the hospital, and Dr. David G. Freiman, pathologist-in-chief and director of laboratories of the hospital and clinical professor of pathology at Harvard.

They suggested that what was once diagnosed as Buerger's disease and resulted in blockage of the arteries in the extremities of the body is due to the formation of blood clots in the arteries and veins or to atherosclerosis. They compared 123 new patients with a diagnosis of Buerger's disease with 1,365 new patients with other forms of arterial disease admitted to Beth Israel Hospital from 1929 through 1956.

The number of diagnoses of Buerger's disease steadily declined, and none was made after 1950. "This suggests increasing reluctance on the part of physicians to make the diagnosis on clinical grounds alone," the researchers stated.

Historically Buerger's disease stems from a pathological description in 1908 by a New York physician, Dr. Leo Buerger. Impressed by the occurrence of gangrene in a small number of young men, he described certain characteristic clinical and pathological features which, he believed, distinguished the vascular disease in these patients from that found in the majority of persons disabled by peripheral arterial obstructions.

During the next 50 years various aspects of this disease were described in several hundreds of articles from all parts of the world, the investigators noted.

Thromboangiitis obliterans has been described as a specific, idiopathic, recurrent, segmental, inflammatory, obliterative vascular disease involving the medium-sized arteries and veins of the extremities and only rarely the visceral vessels.

The researchers concluded that the term Buerger's disease had best be avoided until more convincing evidence of its existence is presented.

Conduction Tissue

Damage to the vital tissue that conducts the electrical impulse which stimulates the muscle

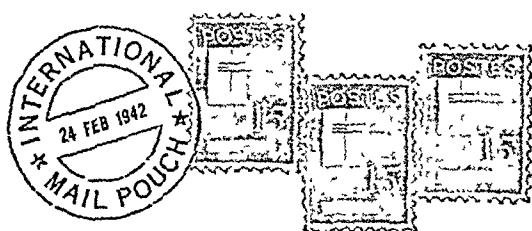
of the two lower chambers of the heart to contract may offer an explanation of some causes of sudden death, according to Dr. George Lumb, Dr. R. S. Shacklett, and Dr. Luther B. Otken, Jr., staff members of the University of Tennessee medical units.

Pathologists are not agreed on whether this vital tissue is composed of nerve or muscle cells, but its importance in the maintenance of life is unquestioned.

The researchers studied the hearts of 260 persons to investigate the diseases which can affect the conduction tissue and produce death

or incapacity of the patient. In a number of instances, the patient died suddenly without significant autopsy findings other than damage to the conduction tissue to explain the suddenness of death.

Pathological lesions found included hardening of the coronary arteries so that there was an inadequate supply of blood to this tissue, inflammation or abscess, hemorrhage or degenerative lesions. The physicians believe that these lesions are perhaps of sufficient magnitude to explain the sudden death of some patients.



The Interns and the Epidemic

When news of 35 deaths and more than 300 people ill in the Dembia Plain came to the Public Health College and Training Center at Gondar, Ethiopia, the college's resources and its first group of interns were mobilized. The symptoms—headache, cough, bloody sputum, muscle pain, and upper respiratory infection—and the investigations of health officers indicated that the outbreak was influenza.

Within 24 hours senior students and graduates were organized into 6 teams, with an intern and 2 senior health officer students on each team. Three teams were assigned to the east side of the Dembia Plain, three to the west side.

The teams traveled from village to village. At each they went first to the chief to explain their mission and to find out how many people had died recently, how many were sick, how long they had been sick, and how many lived in the village. They asked the chief to choose a place where they could see ambulatory patients and they visited the seriously ill. As they saw patients, one man diagnosed, one administered treatment, and one kept records.

The people welcomed the teams because they remembered the malaria epidemic of 7 years ago and feared this sickness was the same disease. But fear and overeagerness sometimes hampered the teams.

Villagers who were well wanted medicine to keep from getting sick. Others wanted only injected medicine. Sometimes faith in medicine was so great that a man adopted the symptoms of the preceding patient. One man asked, "Why do you inject me in the buttock when it's my head that hurts?"

The interns patiently explained that cleanliness and isolation, not medicine, prevented this disease; that medicine was not good for those who were not sick; that different diseases require different medicines; and that an injection is not a cure-all. Often the chiefs as well as the people thought that everyone should be treated.

In the villages, the teams were closely watched. They were asked why they washed their faces in the morning and why they boiled milk, and they were accused of taking the medicine themselves to keep from being sick.

But people wanted them to stay, and often when it was time for a team to depart, there were no mules they could use to continue their journey. Only a stern reminder that the local governors had ordered the villagers to supply them would produce the mules.

The interns also learned to be wary of reports of sickness. Messengers exaggerated the number of the sick to get a team to come to a village. After walking 20 kilometers to find only 1 or 2 patients instead of the 20 or 40 reported, the students learned to make sure a report was verified by a chief.

When the interns had done as much as they could, the teams were recalled to Gondar. They had traveled 1,071 kilometers, visited 57 villages, and treated 2,732 patients.

—ARTHUR C. CURTIS, M.D., former chief, Health and Sanitation Division, U.S. Operations Mission, Ethiopia.

Remunerative homework was found feasible for chronically ill, homebound patients during 2½ years of experience with a group generally considered too incapacitated for vocational activities.

Jobs for the Homebound

MARGARET CLARKE, M.A.

JOBS FOR THE HOMEBOUND is a 5-year demonstration project in vocational rehabilitation operated by the home care department of Montefiore Hospital in New York City. The project is a direct outgrowth of the department's 11 years of experience in providing comprehensive medical care at home to chronically ill, medically indigent patients.

The home care department provides treatment for 85 to 95 patients in the Bronx and upper Manhattan. The patients' illnesses are of such severity that they are unable to attend outpatient clinics and can be maintained at home only with close medical supervision. Care is provided by a medical-social team composed of physicians, social workers, nurses, recreation and art therapists, and physical therapists.

Basic to the philosophy of the home care department is the belief that an indispensable component in medical treatment of the patient is helping him cope with the overwhelming emotional, social, and economic needs which arise with long-term illness. One of the most prevalent of these is the patient's need for meaningful activities appropriate to his physi-

cal condition. Without such activity the patient becomes apathetic and withdrawn, and he may suffer both medically and psychologically.

From the inception of home care, services included a program of diversional activities, and this provided satisfactory occupation for the majority of patients. However, some patients seemed unable to derive satisfaction from leisure-time activities, and from them came a small but very steady stream of requests for "real work." Unfortunately, the community had no facilities for the vocational rehabilitation of homebound patients who were as sick as those found in home care. A survey of rehabilitation facilities for homebound patients in other parts of the country showed that the type of patient seen in home care was consistently excluded from vocational rehabilitation services.

It was decided that the home care patients' persistent requests for work could not be ignored and that investigation of the possibility of their engaging in economically productive activity was warranted. The jobs for the homebound project was initiated on March 1, 1956. The investigation was supported, in part, by a demonstration special project grant from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. The New York Chapter of the Arthritis and Rheumatism

Miss Clarke is co-director, with George M. Warner, M.D., home care executive, of the jobs for the homebound project, department of home care, Montefiore Hospital, New York City.

Foundation, the New York Heart Association, and the Nathan Hofheimer Foundation also provided grants for the project.

Objectives

The objectives of jobs for the homebound are:

- To demonstrate the possibilities in vocational rehabilitation for homebound, handicapped individuals with low productive capacities, exploring the potential of such persons for vocational rehabilitation and studying the individual and social effects of vocational rehabilitation on such persons.

- To develop methods for and to determine the cost of providing vocational rehabilitation services to this type of patient.

- Through the information thus obtained, to encourage and facilitate the provision of vocational rehabilitation services to homebound persons presently not considered eligible for these services.

Methods and Organization

Jobs for the homebound functions as an integral part of the home care department, adding vocational rehabilitation to the treatment program of patients for whom this service is indicated. The project began in response to persistent requests from some patients, estimated originally at 30 percent of the total number receiving home care. The idea of working does not occur to many home care patients; generally they are seriously ill persons whose medical conditions are irreversible. Each home care patient who expresses a desire to work and for whom the staff believes work would be beneficial is admitted to the project.

Following admission, the patients are carefully evaluated. Medical evaluations are based on a patient's medical history, results of current physical examination, diagnosis, and an analysis of physical capacities. The psychological and social evaluations include the results of the thematic apperception test and sentence completion test covering attitudes toward illness, a guided interview of work history with emphasis on the meaning of work to the patient, a social data questionnaire, a housing evaluation, and an analysis of patient-family relationships. The

scores and observations on intelligence, interest, skill, and aptitude tests and the education, work experience, and interests revealed in the vocational counseling record are considered in the vocational evaluation of the patient. The project staff then attempts to develop appropriate work plans for the patient.

Patients who in the course of the evaluations, or later, proved to lack ability or incentive to work are carried as inactive participants on the project. This procedure is followed so that the characteristics of the inactive participants can be compared with those of patients who accepted work, and the proportion of the potential candidates for work who subsequently proved unsuitable for work can be ascertained.

Detailed records of work activities are maintained. The patients' reactions to work are continuously observed by home care and project staff members. Medical, psychological, and social effects of work on the patient are formally evaluated yearly.

The co-directors of jobs for the homebound are the home care executive, who is a physician, and the home care supervisor of recreation and art therapy. The professional staff is composed of a vocational rehabilitation specialist and a design specialist. A clinical psychologist, a sociologist, an internist, and a statistician are consultants to the project. The nonprofessional staff consists of a secretary and an assistant workshop foreman who handles stock, pickup, and delivery.

An advisory committee of community leaders in business, industry, and philanthropy who are members of the Montefiore Hospital Board of Directors provides overall guidance for the project and specific assistance in matters pertaining to business and industry.

Characteristics of Patients

Of the 194 patients admitted to home care during a 2½-year period from March 1956 to September 1958, 73 were considered for the project, 34, or 17.5 percent, were admitted, and 39, or 20.1 percent, of those suggested were not admitted (table 1).

Patients were discharged from the project when discharged from home care. Of the 34 patients admitted, 10 were hospitalized during participation and were readmitted to the proj-

Table 1. Reasons by frequency for not admitting 39 home care patients to the project, October 1956–September 1958

Reasons ¹	Number of patients	Percent	Reasons ¹	Number of patients	Percent
Staff opinion-----	39	65.0	Staff opinion—Continued		
Physical basis-----	21	35.0	Psychological basis—Continued		
Insufficient physical capacity-----	7		Insufficient mental capacity for work due to brain damage-----	2	
New home care patient; staff wanted to observe performance in recreational activity before exposing to work-----	7		Patient would be unduly upset should he have difficulty in performing work assigned-----	1	
Patient extremely disabled and not capable of performing work currently or potentially available; admission held until promising work found or devised-----	3		Recreational therapy appeared to fill patient's occupational needs-----	1	
Patient needed physical therapy or training in activities of daily living or both before work activity-----	2		Patient refusal-----	13	21.7
Patient physically able to work outside the home-----	2		Felt himself to be too ill or disabled-----	3	
Psychological basis-----	18	30.0	Not interested in type of work available-----	1	
Patient insufficiently motivated-----	4		Did not want to be tied to a work schedule-----	1	
Patient would resent the simple type of work which he was capable of performing-----	4		Did not want to return a portion of earnings to department of welfare-----	1	
Patient currently too absorbed in medical or personal problems to concentrate on work-----	3		Would consider only return to former employment-----	1	
Independent activities and interests appeared to satisfy patient's occupational needs-----	3		Did not feel he needed money-----	1	
			No reason given-----	5	
			Other-----	8	13.3
			No worker to carry patient due to temporary staff vacancy-----	4	
			Patient to be discharged from home care in near future-----	3	
			Patient died after referral and before admission-----	1	
			Total-----	60	100

¹ Average number of reasons for not admitting patients: 1.5.

ect when readmitted to home care, and 12 were permanently discharged. Seven died, four improved sufficiently to attend outpatient clinics, and one was discharged because he could afford to pay for private medical care.

Of those admitted, 19, or 55.9 percent, were women and 15, or 44.1 percent, were men. (Fifty-seven percent of the patients admitted to home care during the 2½-year period were women.) The median age of the patients was 51.5 years. More than half, 19, were married, 8 were widowed, 1 was divorced, and 6 were single.

Heart disease was by far the most prevalent diagnostic category among patients. Fifteen, or 44.1 percent, of the patients had heart disorders; nine of these had rheumatic heart disease. The others according to diagnostic

categories included pulmonary diseases, four; arthritis, four; diseases of the circulatory system, three; and metabolic diseases, three. The remaining categories with one patient in each were allergies, diseases of the muscular skeletal system, diseases of the central nervous system, cancer, and neurosis.

Three-fourths of the patients had from one to six complicating conditions in addition to the primary diagnosis. Although a few patients were able to leave their homes for short periods daily, the majority were totally home-bound. Eighteen were ambulatory in their homes, 10 ambulated with difficulty, 4 were wheelchair-bound, and 2 were bed-bound; 27 had relatively good use of their hands and, 7 had moderately or severely limited use.

The patient's physician did not recommend

Table 2. Patient performance of industrial homework contracts,¹ October 1956–September 1958

Product and operations	Skills required	Median number hours worked per patient per day	Total earnings per week per patient		Subsidy per week per patient	
			Range	Median	Number patients subsidized ²	Percent total earnings subsidized (median)
Bag seals: hand assembling of three components, bulk packaging.	Moderate finger and manual dexterity.	2	\$4. 60–12. 60	\$6. 95	6 (6)	33
Plastic key chain puzzle: hand assembling of six components, unit packaging.	Moderate degree of finger and manual dexterity.	1½	\$2. 80–4	\$3. 40	2 (4)	28
Christmas tags: counting assorted tags, inserting in cellophane bags, heat sealing, packing bags in display cartons.	Moderate gross dexterity	2	\$2. 60–9. 30	\$5. 60	4 (7)	50
Metal souvenir party favor: gluing decoration on metal can opener, unit wrapping, and packaging.	Moderate degree of finger and manual dexterity.	1¾	\$10	\$10	0 (1)	0
Hospital linens: machine sewing, seaming, hemming, counting, folding.	Moderate degree of finger and manual dexterity; experience with sewing machine.	1½	\$2–9. 60	\$4. 90	5 (6)	34
Handkerchiefs: hand folding, assorting, pinning, carding in units.	Moderate degree of finger dexterity, unimpaired vision.	2	\$4. 40–11	\$7. 20	3 (6)	18
Display card: stringing plastic cord through 8 holes on card, bulk packaging.	Slight degree of finger and manual dexterity.	3	\$0. 52–19	\$8. 44	11 (16)	30
Milan straw leaf decoration: straw laced around pattern, hand sewn, and shaped into millinery leaf.	Moderate to good degree of finger and manual dexterity; visual acuity.	1½	\$1. 20–15. 60	\$6. 25	4 (7)	62
Butter knife set: wrapping gift box, tying with bow.	Moderate degree of finger and manual dexterity.	2½	\$8	\$8	0 (1)	0

¹ For one contract, preparing a visual display, three patients worked on a sample only.

² Figures in parentheses indicate the number of patients engaged in each contract.

rigid restrictions on activity for the majority of patients with heart disease or for those in the other diagnostic categories. The patient was allowed to set his own limitations on the number of hours he could work and the movements he could make. This flexible approach was possible because the physician visited the patient frequently and was aware of the patient's work and of any impact it had on his medical condition. Also, the vocational worker, in close contact with the physician, could demonstrate any work being considered for a patient

and ascertain the physician's approval or disapproval.

The psychologist found that the patients' emotional attitudes were strongly influenced by their illnesses, and their attitudes toward illness were quite solidly fixed since they had been ill for months or years before admission to the project. The most prevalent emotional response to illness was depression. The most frequent bases for depression were absence of hope for cure, the feeling of being a drain on the family, and inability to continue activities,

**Table 2. Patient performance of industrial homework contracts,¹ October 1956–September 1958—
Continued**

Product and operations	Skills required	Median number hours worked per patient per day	Total earnings per week per patient		Subsidy per week per patient	
			Range	Median	Number patients subsidized ²	Percent total earnings subsidized (median)
Handkerchiefs: hand folding, counting, and unit boxing.	Normal finger and manual dexterity.	1½	\$3–5. 60	\$4. 30	2 (6)	45
Christmas cards: counting, and unit packaging.	Moderate gross dexterity.	3	\$2–4. 63	\$2. 30	3 (4)	36
Envelopes: addressing by hand from printed alphabetical file card.	Literacy; clear handwriting; moderate degree of finger dexterity.	3½	\$0. 40–22	\$8	4 (7)	12
Plastic hankings: folding, tying with rubber band, bulk packing.	Normal finger and manual dexterity.	2	\$2. 75	\$2. 75	0 (3)	0
Dressing packages: counting dressing components, unit wrapping, bulk packaging.	Normal finger and manual dexterity.	3	\$1. 60–8. 80	\$4. 50	8 (8)	40
Linked key chain and charm: assembling three component parts, bulk packaging.	Normal finger and manual dexterity.	2	\$4. 20–8. 53	\$6. 50	0 (8)	0
Plastic garment bags: hand folding, counting, bonding, unit wrapping, and packaging.	Moderate finger and manual dexterity.	4	\$4–22	\$12. 25	4 (5)	33
Closet accessory dress clips: counting, packaging in cellophane bags.	Slight to moderate gross dexterity.	1	\$3–5. 20	\$4. 40	1 (1)	65
Metal rings and tie clips: piercing and monogramming according to specifications.	High degree of finger and manual dexterity; jewelry experience.	1½	\$6	\$6	0 (1)	0
Cardboard washer disks: punch die-cut disks from cardboard insert tack, bulk packaging.	Normal to fine finger and manual dexterity.	3	\$8. 76–32. 88	\$14	2 (5)	42

such as work and homemaking, which were lifelong criteria of value and acceptability.

The sociologist's data showed that the majority of project participants were from the lower or working classes. Their educational backgrounds were limited, the average number of years of schooling being 8.9. Most had done semiskilled or unskilled work prior to illness, a few were former white collar workers, and none had followed professions. Their median annual earnings prior to illness were \$2,375.

More than one-third of the patients were

born outside the United States, 11 of these in Eastern Europe. Fourteen were Jewish, 6 Italian, 3 Negro, and the others were scattered throughout a number of ethnic and religious groups.

The composition of the group mirrored the ethnic and religious characteristics of the community served by Montefiore Hospital. In this area are predominantly Jewish neighborhoods, predominantly Italian neighborhoods, a few scattered pockets of Irish, and one large traditionally Jewish area increasingly populated

by Negroes and Puerto Ricans. In comparison with the United States population, there was a disproportionately high number of foreign born among the participants.

Work Activities

The most important and dramatic outcome of the project to date is the finding that there is available work which can be performed by patients generally considered to be too incapacitated to work. In a 1-year period 17 such patients put in 3,306 man-hours of productive work and earned from \$1.20 to \$32.88 per week.

There were two types of work for patients in the project: performance of simple industrial processes on jobs subcontracted from local industries; and individualized work activities for patients who were unsuited to industrial homework because of physical disability or because they had special talents and interests. Industrial homework was handled by the vocational rehabilitation specialist and individualized work plans by the design specialist.

Twenty-two patients engaged in work activity extensively, and 11 rejected work on all or the majority of occasions when it was offered. One patient had not yet been offered work because of recentness of admission.

All 22 patients who engaged in work activity worked on at least one industrial homework job. Work plans were also developed for 16 of them by the design specialist. Frequently the work plans originally developed for individual patients subsequently proved applicable to project patients generally.

Industrial Homework

Twenty industrial homework contracts were obtained in the 2½ years. Most of the work consisted of simple, nonskilled operations. Typical jobs included packaging of Christmas tags, assembly of key chains, and sorting and packaging of garment bags and hospital dressings (table 2).

More industrial homework was found than had been expected since a very small and limited "work force" could be offered to prospective employers. While it was not always possible to maintain a steady flow of suitable work



A patient with rheumatoid arthritis works in bed. She staples a display card, homework obtained through an industrial contract.

for all patients, there was always enough work for at least half the patients.

Industrial homework contracts were more readily obtainable from sheltered workshops in the community and from Montefiore Hospital than from industry. All except 4 of the 20 contracts obtained came indirectly from industry through a sheltered workshop or from Montefiore Hospital.

The majority of the contracts were of relatively short duration and involved small amounts of money. The median length of the contracts was 5.5 weeks; the median income per contract was \$23.10. More than half the contracts carried time and production quotas.

No equipment or materials other than those supplied by the manufacturer were necessary for the majority of the contracts. It was found impracticable to obtain or devise special equipment to compensate for a patient's disability; the expenditure of time and money which would

have been necessary were not justified for the short, low-paying contracts.

The ability and skill required of the workers were modest. Only two contracts required work with a high degree of finger dexterity and nearly half required only moderate finger and manual dexterity. Not all jobs were appropriate for all patients. The median number of patients for whom a contract was suitable was 5.5.

The production records of 17 patients who performed industrial homework for all or part of a 1-year period were analyzed. They worked a median of 10.25 hours per week or approximately 2 hours per day, and the number of hours was markedly influenced by the type of work performed. For example, one contract, inserting lacing through a display card, was so nontaxing that patients who customarily worked 2 to 3 hours a day worked at it for 6 to 8 hours.

In accordance with regulations of the U.S. Department of Labor, patients were paid at piece rates comparable to those paid nonhandicapped workers performing similar jobs. Patients who failed to earn an average of 40 cents an hour while working at piece rate were subsidized up to this amount, the subminimum rate approved for the project by the Department of Labor. The median earnings per patient were \$4.64 per week, and the median subsidy per patient was \$1.02 per week or 8 cents per hour. Approximately half of the patients consistently required fairly high subsidy; the other half, only small amounts of subsidy and only on occasional jobs.

Although all the patients were seriously ill, the range of capacity for economic productivity among them was considerable. At the top level was Mrs. A. T., 52, with rheumatic heart disease. During a typical 1-month period, she worked at several different industrial jobs for a total of 53 hours, earned \$27, and required no subsidy. On the lowest level was Mr. S. R., 41, with multiple sclerosis. In 1 month he worked a total of 20 hours, earned \$8, of which \$5.60 was subsidy.

The work performed for a sheltered workshop demonstrated the advantages in the sharing of contracts by workshops and homebound programs. The increase in the size of the "labor force" and the diversified skills made

available when workshop and homebound clients joined forces enabled the combined group to fulfill larger and more complex contracts than either could do alone.

The contracts with Montefiore Hospital for machine sewing of surgical supplies and packaging of cotton and gauze dressings demonstrated a work plan widely applicable for the disabled. This type of work is required by hospitals throughout the country and should, therefore, be available to sheltered workshops and homebound programs nationwide.

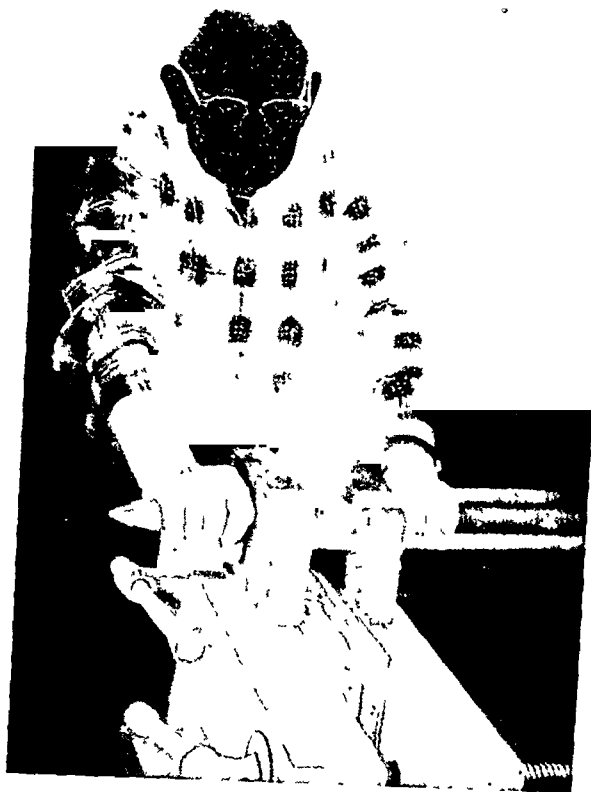
Individual Work Plans

Special work plans were developed by the design specialist for patients who found industrial processes difficult because of impairment of manual dexterity and for those who had special talents and skills and preferred more challenging activity than industrial homework.

In developing work plans for severely disabled patients, the design specialist geared her efforts to the problems presented by two women with rheumatoid arthritis. The movement of fingers, wrists, and arms was so drastically limited for these women that they represented the minimum manual ability in the group. It was assumed that any work plan that proved physically possible for them would be widely applicable among others who found industrial processes difficult.

The first work plan developed for the arthritis patients was based on the vocational background of the women concerned. Both had been sewing machine operators prior to illness and were anxious to resume this type of work. They were found able to handle straight machine sewing, their knowledge of the process being so firmly ingrained that they were able to adapt the process to their manual limitations.

The design specialist found that Montefiore Hospital manufactured for its own use glove covers, syringe covers, binders, and other surgical supplies which required simple machine sewing. The patients were tested on manufacture of these items and proved able to produce them satisfactorily. The project then contracted with the hospital to supply a portion of its requirements for surgical supplies. The job was transferred to the industrial homework



A patient with bronchial asthma binds medical journals. Formerly a skilled carpenter, he works at bookbinding approximately 4 hours a day.

category when it proved appropriate for five women in addition to the arthritis patients.

The second work plan initiated for severely disabled patients was the development of salable articles so designed that their production required only movements which these patients were able to make. Again the arthritis patients were the guinea pigs.

The first step in devising a product was to have the arthritis patients experiment with the process to make sure that they could carry out each of the required movements. A sample of the product was then made and submitted to the buyers of representative department stores and gift shops in New York City. Products were modified or discarded on the basis of the buyers' opinions. Products with which the design specialist experimented included block-printed and silk-screened napkins, place mats, greeting cards, hand-stenciled glasses and bottles, and ceramic tile ashtrays.

By September 1958 six patients were producing for sale machine-sewn tablecloths and ceramic ashtrays. These articles were being marketed through Free Will, a distribution agency sponsored by the New York State Division of Vocational Rehabilitation. Numerous other products were still in the experimental stage.

The design specialist developed four specialized work plans for patients who preferred more challenging work than the industrial jobs available on the project. One such patient was Mr. C. K., a former carpenter, with severe pulmonary emphysema. He had been enormously proud of his ability to design and construct fine furniture and was bored with and somewhat contemptuous of the nonskilled industrial homework. The design specialist helped this patient develop an original method of bookbinding at home. A sizable amount of work was obtained for him in the binding of professional journals for physicians in the hospital.

Another patient, a young man who had had diabetes for most of his life, was trained in jewelry making. For three women who were highly skilled in needlework a contract for sewing of a millinery decoration was obtained. Three women who did exceptionally fine knitting were helped to market their work through a specialty shop.

Impact of Work on Patients

By September 1958, 13 patients had completed a year or more of participation in the jobs for the homebound project. Eight accepted work on the majority of occasions when it was offered, and five consistently refused work.

The data on the impact of work on the eight patients who accepted work should be interpreted most cautiously. The material was obtained from both formal evaluation procedures and the informal observations which physicians, social workers, and others made in the course of routine contacts with the patients.

The strongest impact of work appeared to be psychological. Some degree of improvement was observed in all eight patients who worked for a year or more. The most frequently reported psychological effects were reduction of depression and increased feelings of adequacy.

Improvement was seen in the attitude of each of the eight patients toward his illness rather than in measurable clinical improvement. Changes included less preoccupation with limitations and relinquishment of unrealistic plans for the future. In only one instance did work appear to bear some relationship to a symptomatic change in the patient.

Work was reported to have had an impact on patient-family relationships of five patients who worked for a year or more; no impact in this area was reported from the other three. Though for all five, some improvement in family-patient relationships was reported, in two, family relationships were also disrupted in some respect when the patient worked. For example, one patient's mother resented her son's earning money because it threatened her need to keep him dependent upon her.

Responses to work activities appeared to be conditioned by the relationship to home care of six patients; no such influence was noted for the other two. These six were observed to enjoy the attention of the staff and to seek their approval. In at least one instance a significant element in the patient's motivation for work seemed to be the desire to comply with what the patient believed to be the staff's wishes.

Twenty-two, or 11.3 percent of the patients admitted to home care, accepted work on all or the majority of occasions when it was offered. The fact that 11 percent of a group of severely incapacitated patients proved capable of economically productive activity is significant as an indication of the untapped human resources available among severely disabled homebound persons in the country as a whole.

Certain differences were observed in the characteristics of the patients participating in the project and the home care group as a whole. Project participants were younger; their median age was 51.5 years; for home care, it was 60.1 years. There was an indication that project participants were slightly less ill than home care patients generally; the average number of admissions to the hospital for project patients was 1.1, for home care patients, 1.6.

The 11 patients rejecting work differed from the project group as a whole in several respects. In this group there were more women (72 per-

cent) than in the project group as a whole (55.9 percent), and the median age was older (54.5 years) than the 51.5 median age of the total project group. Also, the median number of years of education was lower (7.3) than for all patients (8.9). There appeared to be no significant differences in the diagnostic categories of the patients who did not accept work and the total project group.

Two reasons were most frequently cited by patients for not working; they did not like the type of work offered, finding it dull, uninteresting, or beneath them, and they felt too ill to work. On the other hand, the staff opinion concerning the majority of these patients was that their refusal to work was on an emotional basis. For example, some patients were too preoccupied with illness to concentrate on work; others had not accepted the limitations of their illnesses sufficiently to be satisfied with the sedentary work of which they were capable.

Costs and Applicability

Experimentation with more than 25 different work plans indicated possibilities for numerous types of work programs of varying costs for the kind of patient found in home care. Program costs will depend on the number of rehabilitation services such as vocational counseling and testing offered and the degree to which the program attempted to fit each patient into an individually suitable job.

Examples of homework programs of varying costs which can be incorporated in medical home care programs and can serve 20 patients follow.

- Minimal cost program confined to one steady contract such as the jobs for the homebound contract with Montefiore Hospital for the packaging of hospital dressings.

Staff (a half-time program supervisor-instructor who would supervise the program and instruct patients in work processes, a full-time pickup and delivery man, a half-time secretary)-----	\$8,100
Travel to patients' homes-----	280
Office supplies-----	95
Occupational licenses-----	25
Overhead (15 percent of direct costs)-----	1,500
Total -----	\$10,000

• Medium cost program providing diversified industrial contracts sought from local firms.

Staff (a full-time vocational rehabilitation specialist who would supervise the program, solicit industrial contracts, and instruct patients in work processes; a full-time pickup and delivery man; a half-time secretary)-----	\$11,390
Travel to patients' homes-----	360
Travel for solicitation of work-----	300
Office supplies-----	150
Occupational licenses-----	25
Work equipment-----	525
Overhead (15 percent of direct costs)-----	2,250
Total -----	\$15,000

• Relatively expensive program incorporating all service features of jobs for the homebound project including product development and diversified industrial homework contracts.

Staff (a full-time vocational rehabilitation specialist who would supervise the program and be responsible for all industrial homework and for vocational testing and counseling, a design specialist hired as a consultant, a full-time pickup and delivery man, a half-time secretary)-----	\$13,804
Office supplies-----	175
Travel to patients' homes-----	396
Travel for solicitation of work and marketing of products-----	300
Occupational licenses-----	25
Work equipment for patients-----	600
Overhead (15 percent of direct costs)-----	2,700
Total -----	\$18,000

Summary

Jobs for the homebound is a 5-year project concerned with investigating the vocational potential of homebound, chronically ill patients who are generally considered to be too incapacitated for vocational rehabilitation services. The project has been in operation for 2½ years as an integral part of the home care department.

It was found that there was available work which could be performed by seriously ill, homebound patients. In 1 year the project patients put in 3,306 man-hours of productive work and earned from \$1.20 to \$32.88 per week. The patients who worked constituted 11 percent of the patients admitted to home care. This figure is highly significant when it is considered that among the chronically ill, homebound persons throughout the Nation a similar portion also has a potential for productivity.

All patients who worked for a year or longer were reported to have experienced some degree of psychological improvement, primarily reduction of depression. All patients also experienced some degree of improvement in their attitudes toward illness, although it was frequently difficult to tell whether the improvement observed was due to work alone or to the combination of home care services and work.

Experimentation with many different types of work plans indicated that homework programs for the kind of patient found on home care could be operated at reasonable costs, ranging from \$10,000 to \$18,000 per year for 20 home care patients.

Arnold Appointed Assistant Surgeon General

Dr. Richard C. Arnold, chief of the heart disease control program of the Public Health Service for the past 3 years, has been appointed Assistant Surgeon General for Personnel and Training. He succeeds Dr. Otis L. Anderson, who retired on June 30, 1959, after 30 years' service in the commissioned corps.

A career officer of the Service's commissioned corps, Dr. Arnold previously served 6 years as chief of the Technical Services Branch

of the National Heart Institute, after having directed syphilis research at the Venereal Disease Research Laboratory in Staten Island, N.Y., for 13 years. His initial posts with the Service, on completion of his professional studies at the University of Louisville in 1930, were in hospitals in New Orleans and San Francisco in venereal disease work. Dr. Arnold's grade is equivalent to that of brigadier general.

Trends in Occupational Health Programs in State and Local Units

VICTORIA M. TRASKO, A.B., and CHARLES D. YAFFE, M.S.

THE YEAR 1959 has been outstanding in the development of occupational health programs in State and local governments. Both the number of units and personnel reached a new high, exceeding for the first time the 1950 peak. Presently, 484 professional personnel staff 76 occupational health units located in 40 States, including Hawaii, the District of Columbia, and Puerto Rico, and in 33 local health departments. Three of the State programs (New York, Massachusetts, and Illinois) are in departments of labor, and the rest are in health departments. The growth pattern, however, has not been uniform. Nor has the personnel rise been commensurate with the increased responsibilities of State and local occupational health agencies. Frequently, additional staff has been largely absorbed by the newer industrial health problems associated with air pollution and radiation.

Personnel

Growth trends are illustrated by a series of charts based on directories of governmental industrial hygiene personnel issued annually since 1942 by the Occupational Health Branch. Figure 1 shows that the growth in the number

of personnel in local units has been slow but steady. In 1942 they accounted for 10 percent of total staffs, and in 1959, for 20 percent. Total State and local staffs fluctuated from a low of 247 members in 1942 to a high of 425 in 1950, then dropped to a low of 360 in 1957, and rose sharply to the present new high of 484 persons.

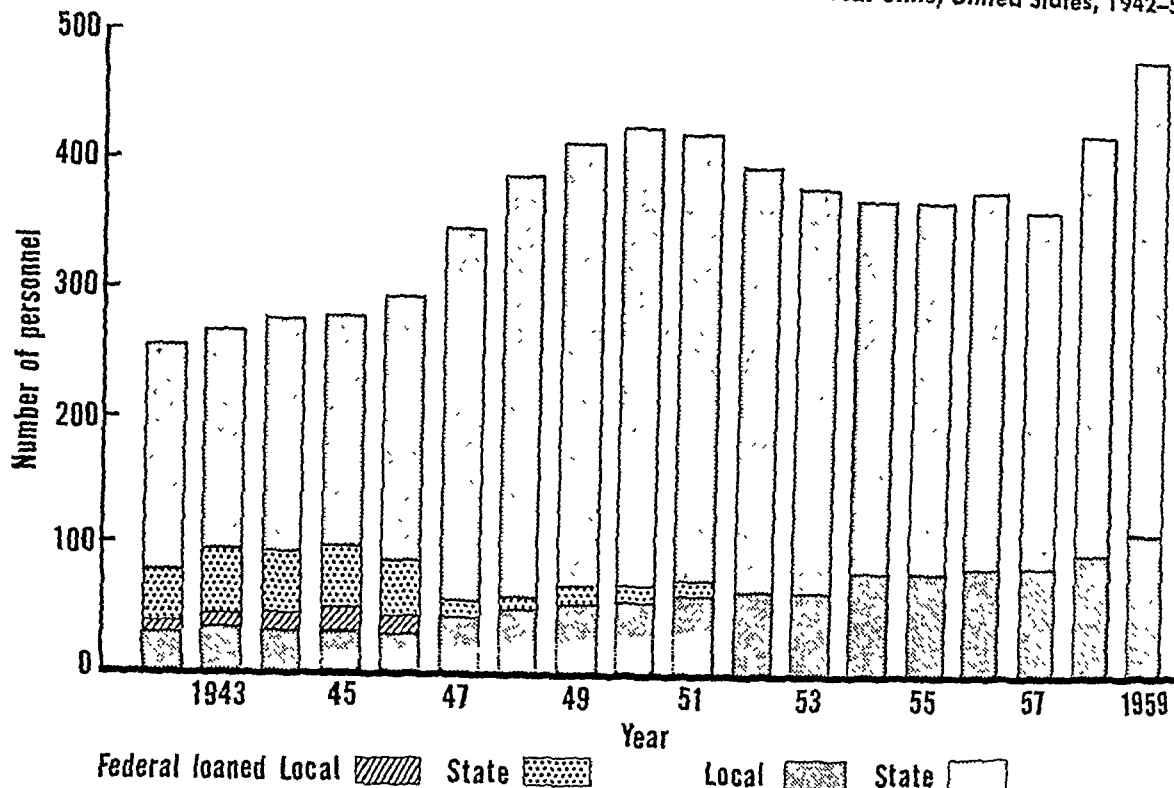
State programs developed most rapidly immediately following the passage of the Social Security Act in 1935, when funds were made available for expansion of public health programs, including industrial hygiene. National defense activities and World War II accelerated the establishment of additional units so that by 1942 there were programs in 36 States and 7 local health departments with a total of 247 professional personnel, including 44 on loan from the Federal Government.

The impetus that led to the 1950 peak in personnel was the designation of Federal grant-in-aid funds for industrial hygiene. Spread over the 3-year period 1947 to 1950, these funds also helped to offset the withdrawal in 1946 of Federal personnel on loan by providing monies for recruitment of trained industrial hygiene personnel being released from military service.

The subsequent discontinuance of earmarked funds and the general decrease in State appropriations resulted in a retrogression in occupational health activity, reflected not only in the loss of personnel but also in the discontinuance of some programs. Part of this decline was also due to the low salary scales then prevailing in government agencies and part to the absorp-

Miss Trasko is program adviser, and Mr. Yaffe, sanitary engineer director, Occupational Health Branch, Bureau of State Services, Public Health Service, Cincinnati, Ohio. The article is based on a paper presented at the Industrial Health Conference in Chicago on April 27, 1959.

Figure 1. Number of occupational health personnel in State and local units, United States, 1942-59



tion of personnel by industry, the armed services, and other agencies that were beginning to employ industrial hygienists at a rapid rate.

All programs were not affected to the same degree. In some instances, their financial situation was stabilized through the appropriation of State air pollution funds for factfinding studies in which the industrial hygiene units cooperated extensively. Otherwise, the setback would have been more serious. It took 8 years to reach the peak in staffs achieved in 1950, a level which was exceeded only this year.

Viewing the long-term growth in staffs, we find that the number of persons in State and local units, exclusive of Federal personnel on loan, has more than doubled since 1942. The growth has been erratic, but the sharp increase from 1957 to 1959 appears indicative of a new upward trend. However, forecasting future growth on the basis of the past is not simple. The fractionation of industrial hygiene programs into specialties, including radiation and air pollution, or the combining of these specialties under one administrative head can readily cause fluctuations in numbers of personnel both

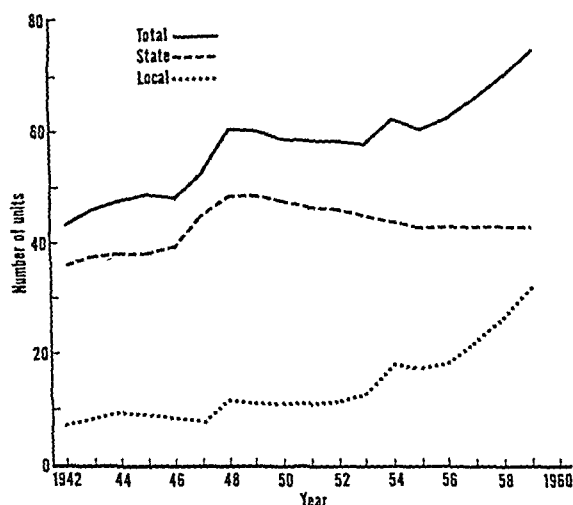
at an individual State as well as the national level.

However, a closer look at the nature of the increase from 1957 to 1959 discloses that 22 State and 18 local units, of which 12 are new, have increased their staffs from 1 to 17 persons, or an aggregate of 137 persons. Six State programs account for one-half of the total staff increases during the period.

In contrast, only seven State and three local programs showed a net decline in personnel. The maximum loss in any unit was 2 persons, and the total loss was 13. Twenty-six units now functioning showed no change.

Today's comeback in personnel is actually greater than the gross numbers show. The present counts are based strictly on information received for annual directories of occupational health personnel in government, and are not all inclusive. For example, they exclude industrial hygienists employed by industrial commissions in at least four States. Likewise, certain local health departments providing limited occupational health services may have escaped attention.

Figure 2. Number of occupational health units, United States, 1942-59



Units

Figure 2 depicts trends in the number of units functioning since 1942. The high point in the number of State units occurred from 1948 to 1950, when all but two States provided occupational health services on at least a limited basis.

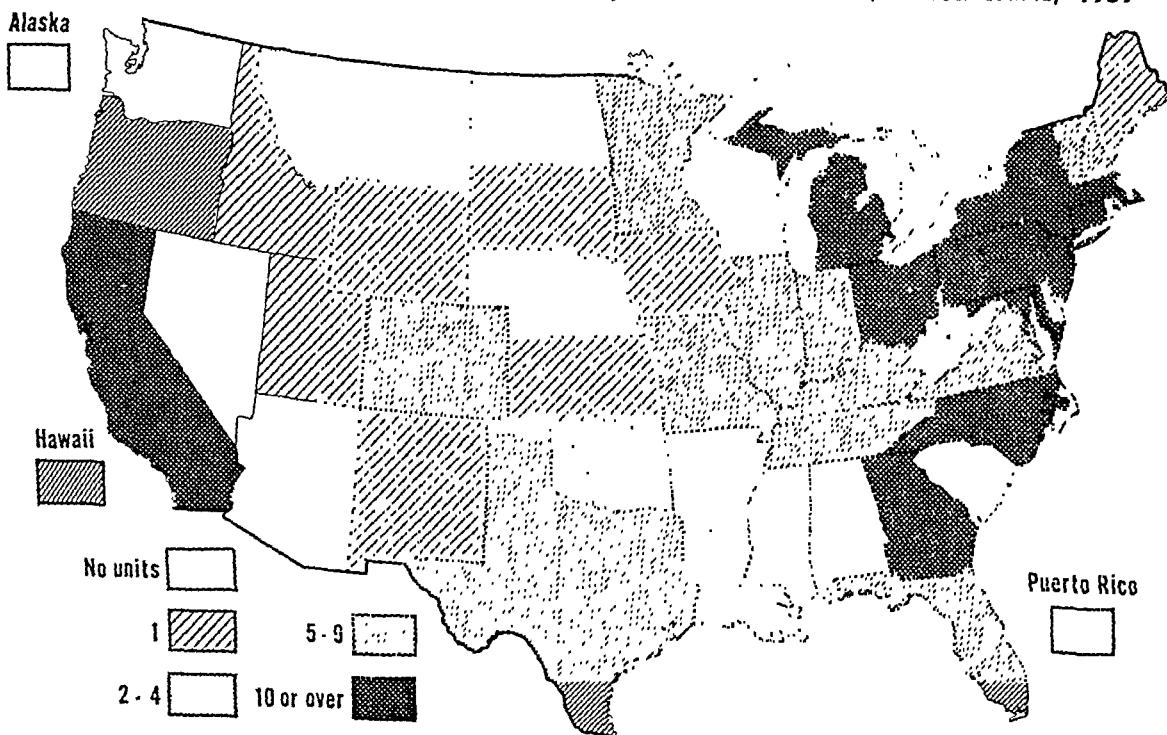
As a result of loss of funds and postwar reduction in industrial activity, a number of States discontinued programs. Today 10 States including Alaska still do not have occupational health programs in either health or labor departments.

On the other hand, local units have shown a gradual upward trend, especially for the last 10 years. In contrast with 7 units in 4 States in 1942, today 33 units are found in 15 States. The effects of vigorous State efforts to encourage the establishment of local occupational health units are evident in California, which has about one-half of these 33 units. This trend for local health departments to assume responsibility in occupational health is highly promising. Local health departments occupy a strategic position in promoting community health in all its aspects.

Size of Units

Although the number of State units has remained stable during recent years, the number of staff members has been increasing since a low

Figure 3. Number of personnel in State occupational health units, United States, 1959



point in 1954. Significantly, at present only 21 percent of the units employ two to four persons, as compared with 48 percent 3 years ago, and units with five or more persons today represent 58 percent of the total as compared with 40 percent in 1947.

There has been no significant pattern for one-man units, although the total number has increased slightly during the past 3 years. The eight units currently in this category are in States which, generally, are not highly industrialized (fig. 3).

With the exception of California, State units with 10 or more persons are located in the eastern part of the country. Units with five to nine persons are scattered, whereas the units with smaller staffs are concentrated chiefly west of the Mississippi River.

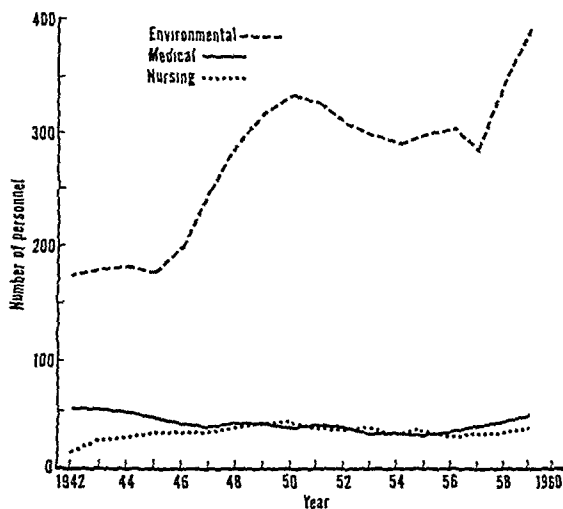
Professional Staffing Patterns

When State and local governments first engaged in occupational health, their primary objectives were improvement of the working environment and elimination of health hazards. Over the years their programs have continued to emphasize environmental studies, with such activities accounting for 70 to 90 percent of all direct services to industry. The need for balanced medical-environmental programs has long been recognized, but their development has been hampered by lack of appropriate personnel and, in some instances, lack of sufficient motivation.

Figure 4 shows clearly the great differential between environmental and medical and nursing personnel. Environmental personnel, consisting of engineers, industrial hygienists, and chemists, accounted for about 70 percent of total staffs during the war years, 1942-46. For the past 10 years, the percentage has hovered about 80.

The present low level of medical personnel in State and local units should not be compared with that during the war period, when about one-half of the physicians were on assignment from the Public Health Service. These units have consistently experienced great difficulty in recruiting and keeping medical personnel. Some gain in industrial nursing consultants was made during the war years. Since then,

Figure 4. Number of environmental, medical, and nursing personnel in State and local occupational health units, United States, 1942-59



their number has remained comparatively the same.

Trends in Program Content

To obtain information on program content, a limited survey was conducted among directors of 12 State and 2 local occupational health units. These units, widely scattered geographically, employ from 5 to more than 50 professional personnel, with an average of 11. While they do not necessarily represent an accurate sample of the entire country, their replies are significant.

In discussing changes of program emphasis, 5 of the 14 directors mentioned increased attention to radiation problems, 2 to air pollution, 1 to silicosis studies and research, and 1 to labeling activities. In five units, the change is toward extending direct services to more establishments as well as to more diverse types of industries. Three directors are actively promoting the establishment of occupational health services in local health departments, and one is expanding appreciably its informational and educational activities.

In considering activities requiring more emphasis, seven directors agreed on the need for more comprehensive or improved coverage of industrial establishments. Four directors men-

tioned the necessity for better educational and informational services to industry, and two expressed a need for closer and better working relationships with industry, the medical profession, and other groups on employee health services. The need for more and better trained personnel in local health departments was also mentioned. Only two directors expressed a need for more emphasis on radiation and one, on air pollution, possibly because most of the other units were already involved. Two directors believed their programs are adequately balanced for the present.

The directors' estimates of total staff time spent on different components of their programs showed a remarkable agreement. For example, 12 of the 14 directors estimated that at least 50 percent of total professional staff time is spent on field investigations and services. The range for the 14 units is 33 to 92 percent, with a median of 67 percent.

About 15 percent of the total staff time is devoted to laboratory services and developmental research, 15 percent to teaching and health education activities, and about 2 percent to civil defense. Individual estimates for civil defense range from 1 to 7 percent. Six of the directors reported that employee health services for State employees required from 1 to 25 percent of staff time, giving a median value of 4 percent.

Eleven of the fourteen directors reported at least 70 percent of staff time spent in the field is devoted to investigation of occupational hazards. The range was 33 to 95 percent, with a median of 81 percent. This indicates that most of these units still concentrate their efforts in the traditional areas of industrial hygiene.

Wide variations were found in the percentage of self-initiated and requested field visits. One unit reported that 100 percent of its field work results from requests; another that requests account for only 6 percent of its field services. For all 14 units the median value for self-initiated field visits is 62.5 percent.

In the directors' opinions, dusts and ionizing radiation constitute the leading problem areas of occupational health, with solvents and gases next in order. Also mentioned were implant health services and noise. The problem areas

receiving most attention are ranked in the following table.

Problem area	Rank			
	1st	2d	3d	Total
Dusts-----	4	2	3	9
Ionizing radiation-----	5	1	2	8
Solvents-----	2	3	1	6
Gases-----	1	2	3	6
Implant health services---	0	2	2	4
Noise-----	0	1	1	2

Two of the directors of State units would not attempt to separate the promotion of implant health services from investigations of occupational hazards. They stated that all personnel regularly attempt to promote improved health services whenever they visit industry for any purpose. The others show a range from 1 to 20 percent, with 8 percent being typical, for total field time spent on this activity.

The occupational aspects of radiation have continued to increase in recent years. While they have added to the total burden of the occupational health unit, no attempt has been made to segregate them as separate items in terms of staff time, since they are considered part of the broad program to control hazards associated with the working environment.

Because of the training and experience of staff members, many occupational health units have also been given overall responsibilities for radiation problems, community as well as occupational. Among the units reporting in this limited survey, an average of about 4 percent of field time is being spent on nonoccupational radiation problems. However, wide variations in this figure may be expected, depending on the extent of activity and size of the unit.

For example, 17 occupational health units maintain fallout stations and monitor air and precipitation for radioactive fallout as participants in the Public Health Service radiation surveillance network program. Many of their personnel have gone on temporary active duty with the Public Health Service to monitor fallout in connection with weapons testing in Nevada. Likewise, many of these personnel are working in radiation instrument phases of civil defense courses and in monitoring instruction. In one State 18 man-days were spent 1 year in instruction alone.

In the larger units these additional duties usually do not represent a heavy burden. How-

ever, smaller units are likely to find these activities taking a much greater proportion of their time, and at the expense of routine work. Many units have helped to draft regulations for the control of radiation sources. Preparing these regulations may require as many man-days for South Dakota with its one-man State unit as for Michigan with a staff of more than 20. Similarly, the time requirements for operating a fallout monitoring station are the same, regardless of staff size. As more and more regulations on radiation are passed, the responsibility and workload of these units will be increased, especially in the registration of users of radioactive materials or operators of X-ray equipment.

The reporting units indicated that air pollution work in general accounts for about 5 percent of field time, although one State estimates 25 percent of its time on this activity. Here, too, however, it is difficult to obtain a representative figure. Because of the extensive experience of occupational health agencies with industrial emissions, these units have frequently been given responsibility for community air pollution. The line between the occupational and community aspects of air pollution sometimes blurs, making it difficult to separate the time spent on each. Because so much air pollution activity is interrelated with industrial hygiene, many occupational health units consider it as part of their routine investigations rather than a separate item.

At present responsibility for air pollution control rests primarily with occupational health units, as reflected by the 1958 Directory of Governmental Air Pollution Agencies (1). Of the 41 State agencies listed, 30 are in occupational health units and 11 are in other units of departments of health. In New York, the State Division of Industrial Hygiene, Department of Labor, shares the responsibility with the New York State Department of Health, and does the sampling of industrial effluents.

Occupational health units also participate in the Public Health Service's national air sampling network. There are 115 air sampling stations throughout the country, including 19 operated by State and local occupational health units.

Air pollution control is primarily a local

problem, with regulatory authority frequently vested in local boards of air pollution control or in smoke abatement agencies, and technical assistance is often provided by local occupational health units. If control authorities are not set up, the burden of handling air pollution problems usually falls on the occupational health unit.

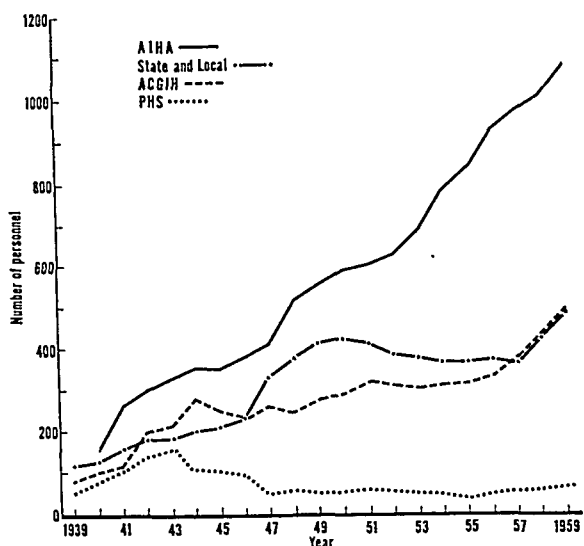
Other Trends

Some State units are stepping up their efforts to encourage the participation of local health departments in occupational health. The growth in number of local units has been mentioned. In addition, there appears to be somewhat greater use of local health department personnel in field activities such as in followup work and in routinely accompanying State personnel on plant visits. The extent to which the States enlist such services varies considerably. This variation may be due partly to the differences in the degree of development of local health services and partly to the lack of conviction in some States of the desirability of utilizing local personnel with limited training in industrial hygiene.

Interest in additional training for personnel is being stimulated by availability of more training facilities and Federal grants and fellowships. Our limited survey showed that 22 persons employed in the 14 units have received a year or more of graduate training during the past 5 years. Some 200 courses of at least 2 weeks' duration have been attended by staff members of these units. Approximately half of these courses have dealt with ionizing radiation. About two-thirds of the remainder have been in industrial hygiene, and the rest were air pollution courses. Likewise, the extent to which State and local personnel participate in training courses for other groups, such as local health department personnel, and in teaching industrial hygiene in schools and universities has also been steadily increasing.

Over the years a handicap to the development of State and local units has been personnel losses and turnover. Since 1942, by actual count of names in the annual directories of government industrial hygiene personnel, 1,470 different persons have been employed at one time or

Figure 5. Occupational health personnel in professional organizations, State and local units, and the Public Health Service, United States, 1939-59



NOTE: AIHA=members of American Industrial Hygiene Association. ACGIH=members of American Conference of Governmental Industrial Hygienists. PHS=professional staff of the Occupational Health Branch, Public Health Service, including personnel on loan to State and local units.

another by State and local units and the Occupational Health Branch of the Public Health Service. Subtraction of the number of persons on current staffs reveals that more than 900, many with excellent training and experience, have left official occupational health agencies for one reason or another during the past 18 years. However, many have remained in the industrial hygiene field, employed by industry, universities, the armed services, and other groups.

In the absence of data on employment of industrial hygienists outside government, the annual membership of the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association and personnel in the State and local units, starting with 1939, have been plotted in figure 5.

The rapidity of growth of the American Industrial Hygiene Association indicates the extent to which industry is employing industrial hygienists. Although a number of association members are in government, the curve provides

a rough idea of the number of industrial hygiene personnel associated with nongovernment work.

If personnel requirements expressed by directors of State and local units interviewed in this survey are typical of present national needs, full-time occupational health staffs in State and local units should number at least 1,000. However, even this figure, more than double the present number, is a ratio of only 1 person for every 65,000 workers in the labor force.

Finally, there is definite evidence of increased financial support for some State and local programs from their own departments. This support was variously attributed. Eleven of the fourteen directors interviewed consider their engineering studies and services to industry their best selling points. Some mentioned specifically the quality and objectiveness of their studies; others, the high professional caliber of work performance which has caused industry to accept government services. Radiation and air pollution activities were mentioned as being popular and helpful in getting appropriations. One director credited his program's financial stimulus to a Statewide conference on occupational health sponsored by the Governor's Council; another to special training courses held for industrial personnel.

Other selling points specified were dissemination of information on industrial health through periodic bulletins and short pamphlets and working with professional organizations and medical groups to bring about a better understanding of industrial health and the contribution of government programs.

One director credits the effective support his program receives to excellent administration by his health commissioner, cooperation with other branches and agencies, and willingness to accept broader responsibilities. This point, the importance of being willing to accept broader responsibilities, cannot be overemphasized in a field with as infinite opportunities for service as occupational health.

Conclusion

Recent growth trends in State and local occupational health units hold promise that the occupational health picture may be improving.

However, these changes mark only a beginning, since occupational health activities in general have long been grossly underdeveloped. Today's record staffs fall at least 50 percent short of the number needed to do a halfway adequate job. It is particularly encouraging to note the increase in local units, and it is hoped that this

tendency and the strengthening of all official agency staffs will continue.

REFERENCE

- (1) 1958 Directory of Governmental Air Pollution Agencies. Pittsburgh, Pa., Air Pollution Control Association in cooperation with the Public Health Service, 1958, 48 pp.



Encephalomyelitis in Horses

An early classic clinical description of what appears to have been western encephalomyelitis in horses has been found by Dr. Roy F. Feemster in a footnote to the section on poliomyelitis in the 1909 annual report of the Massachusetts State Board of Health. The footnote consisted of a letter from a practicing veterinarian in Minnesota describing a paralytic disease in horses, and formed a part of a discussion on sickness in animals and poliomyelitis in man. At that time, investigators were looking for evidence of a relationship between paralytic disease in animals and in man. The veterinarian may have been led to write the letter because of a high incidence of poliomyelitis in both Minnesota and Massachusetts in 1909. It is recognized now that the veterinarian probably was describing cases of western equine encephalomyelitis.

The first clinical description of encephalomyelitis in horses may have been made as early as 1831 following an outbreak of paralytic disease in Massachusetts. Dr. Alfred Large described a similar disease on Long Island in 1867.

The entire footnote, including the letter from Dr. C. S. Shore, Lake City, Minn., follows:

"The following letter, which reached the board through the State Board of Health of Minnesota, is of possible interest in this connection:

"In my veterinary practice during the past 5 or 6 years, I have found a disease appearing among

1- and 2-year-old colts that shows a line of symptoms corresponding very closely to anterior poliomyelitis of children. I have had from 5 to 10 cases a year during this time, the cases always occurring during the summer months, and the majority of them during the month of August. The affected colts are usually found in the pasture, unable to stand. The owner sometimes will notice an unsteady gait for 24 hours before entire loss of motion occurs. At first, these colts have a rise of temperature, ranging from 103° to 104° F.; pulse and respiration accelerated; animal sweats profusely; appetite remains fairly good, but there is some trouble noticed in swallowing, especially water; slight derangement of the bowels, tending toward constipation; more or less tympanitis present; retention of urine, for a few hours at least; head drawn back so the end of the nose tends to assume a position somewhat on a line with the neck. The death loss is less than 10 percent, but in those that do recover, the market value is depreciated to a very great extent because of the faulty gait the animal assumes after an attack of this disease, due to atrophy and contraction of certain muscles or certain groups of muscles. It seems that the flexor muscles of the limbs especially are more often affected than the extensor, and in almost all the cases some of these deformities are likely to remain permanent. The flexors of the limbs are liable to contract and cause volar flexion of the fetlock. The elevators of the head are also likely to become affected so as to cause the head to have a poky appearance; that is, it is carried out from the body.

"After one of these attacks the colt will remain down from 1 to 3 weeks, and will then continue to improve for a period of 1 year, but seldom, if ever, makes a complete recovery."

Dr. Feemster is director of the division of communicable diseases, Massachusetts Department of Public Health—CARL C. DAUER, M.D., medical adviser, National Office of Vital Statistics.

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, June 30, 1959*

Wax Used for Milk and Food Containers

I AM INFORMED that both the Food and Drug Administration and the Public Health Service are receiving many inquiries about possible cancer-producing agents in wax used for milk cartons and other food containers.

I think we should try to clarify the situation with respect to these waxes.

During the latter part of 1956, Dr. W. C. Hueper, of the Public Health Service, arranged with the Milk Industry Foundation to collect waxes used by dairies for the impregnation of milk containers. Several months later the foundation assembled about 40 waxes for further chemical and biological analysis and sent them to the National Cancer Institute. In June 1957, 24 of these waxes were sent for study to Dr. Philippe Shubik, division of chemistry, Chicago Medical School. Dr. Hueper provided Dr. Shubik with suggestions for the work and data on the economic, chemical, and biological aspects of dairy waxes. A representative sample of each of these waxes was retained by the National Cancer Institute's Environmental Cancer Section of which Dr. Hueper is chief.

In the fall of 1957, Dr. Hueper received a report from Dr. Shubik on results of preliminary tests of the 24 waxes. The studies were performed by Dr. William Lijinsky, an associate of Dr. Shubik's. It was demonstrated in these studies that one of the waxes contained a known carcinogen (cancer-producing agent), 1,2,5,6-dibenzanthracene. Three additional waxes were suspected but no carcinogen could be identified. It should be noted that while this compound has produced cancer in laboratory animals, 1,2,5,6-dibenzanthracene has not been shown to produce cancer in man.

A report of the results of this investigation was communicated to Ernest Kellogg, secretary of the Milk Industry Foundation. As a result, Mr. Kellogg asked the American Petroleum Institute for assistance in investigating the problem.

Dairy industry representatives also met with Public Health Service milk and food personnel to map out a program to assure that the waxes used were free from impurities. In November 1957, the American Petroleum Institute made available \$100,000 a year for 5 years to support additional studies by Dr. Shubik (Dr. Shubik has indicated that the results will be published as the studies are completed).

Accordingly, Dr. Shubik was supplied an additional sample of 26 representative waxes by the petroleum industry. By the time these new samples were received, Dr. Shubik had improved his analytical techniques to the point where he could identify as little as 1 part of 1,2,5,6-dibenzanthracene in one-half billion parts of wax. In the earlier experiments, sensitivity was 1 part of 1,2,5,6-dibenzanthracene in 1 million parts of wax. With the high sensitivity of the new techniques, no dibenzanthracene has been found in any of the 26 samples.

Meanwhile, in 1958, samples of the 24 waxes sent to Dr. Shubik by Dr. Hueper in 1957 also were sent to Dr. Paul Kotin, associate professor of pathology at the University of Southern California. The major results of this study, made by Falk, Kotin, and Miller, were published in the April 25, 1959, issue of a British scientific journal, *Nature*, pp. 1184-85.

The Kotin investigations confirmed the Shubik findings that one wax contained between

0.5 and 1.0 micrograms per gram of 1,2,5,6-dibenzanthracene. The Kotin investigations demonstrated, in addition, that 1,2,5,6-dibenzanthracene added to dairy waxes for experimental purposes was extracted from thin layers of wax by milk.

The results of these studies have been reviewed by scientists of both the Public Health Service and the Food and Drug Administration. I am advised that the findings are not final, but no indications of a health hazard have been found. The Food and Drug Administration advises there is at present no basis for action concerning these waxes under the Food, Drug, and Cosmetic Act.

The scientists are also agreed that more information is needed. The Food and Drug Administration plans a study of these waxes in its own laboratories if its appropriation for 1960 as now approved by both House and Senate is finally enacted. The Public Health Service also plans to support further studies and to provide technical assistance to the industry in its control program.

It should be pointed out that the new food additives amendment to the Federal Food, Drug, and Cosmetic Act covers the safety of food container materials which incidentally contaminate food, just as it covers additives for direct addition to food.

Permits for Nuclear Waste Disposition

Pennsylvania's Sanitary Water Board has announced seven permits for the discharge of radioactive wastes into streams. Radioactivity of the discharged material is limited to minute levels, and all safeguards are taken to assure that these levels are trivial or insignificant to public health.

The first of these permits, issued November 1, 1957, was for wastes discharged by the Duquesne Light Co. of Pittsburgh into the Ohio River from Shippingport. (*Public Health Reports*, October 1958, pp. 895-901.) Others issued in 1958 were:

March 24. Research laboratory of Mellon Institute of Industrial Research in Penn Township, Westmoreland County, discharging into Bushy Run, tributary of the Monongahela River and two creeks.

March 26. (Amended August 21, 1958.) Research reactor facility of Curtiss-Wright Corporation of Woodridge, N.J., in Covington Township, Clearfield County, discharging into a tributary of Mosquito Creek, flowing into a branch of the Susquehanna River.

March 26. Metallurgical plant of L & S

Machine Co., Inc., of Latrobe, in Unity Township, Westmoreland County, discharging into Four Mile Run, tributary of Loyalhanna Creek.

March 26. Plant for research, development, and manufacture of nuclear reactor components of the Nuclear Materials and Equipment Corporation, of Apollo, in Apollo Borough, Armstrong County, discharging indirectly into the Kiskiminetas River.

April 26. Metallurgical plant processing naturally radioactive metals and producing fuel elements, of Westinghouse Electric Corporation of Pittsburgh, in Derry Township, Westmoreland County, discharging into the Conemaugh River.

May 26. Research reactor of Pennsylvania State University at State College, Centre County, discharging into Thompson Run, tributary of two creeks.

December 23. Testing reactor of Westinghouse Electric Corporation of Pittsburgh, in Sewickley and Hempfield Townships, Westmoreland County, discharging into a tributary of Sewickley Creek.

State and Local Government Expenditures for Health and Hospitals

MARJORIE GOOCH, Sc.D

FOR THE FIRST TIME since 1942, State-by-State data are available on the expenditures of State and local governments for the major functions of these governments (1). The Bureau of the Census obtained these data on the then 48 States and the District of Columbia as part of the 1957 Census of Governments. Although the Census Bureau annually publishes financial statistics for State governments and for cities of more than 25,000 inhabitants (2), similar data for local governments have been available only as estimated nationwide totals. Four functions—education, highways, public welfare, and health and hospitals—accounted for nearly three-fourths of the total State-local general expenditures in 1957. General expenditures represent the amounts spent for public programs but exclude State-owned and State-operated enterprises and trust fund operations.

Of the total general expenditures by State and local governments of \$40.4 billion, health and hospitals accounted for \$3.2 billion—\$2.6 billion for hospitals and \$0.6 billion for health. New York State spent the largest amount for health and hospitals combined (\$521.5 million) and South Dakota the smallest amount (\$5.6 million). Expenditures for hospitals ranged from \$446.0 million in New York State to \$4.1 million in Vermont. Expenditures for health varied from \$75.5 million in New York to somewhat less than \$1 million in Nevada.

Dr. Gooch is a public health research analyst in the Division of Public Health Methods, Public Health Service.

On a per capita basis, the average expenditure by State and local governments for health and hospitals combined was \$18.80; for hospitals, \$15.56, and for health, \$3.24. Aside from the District of Columbia, the State with the highest per capita expenditure for health and hospitals together (New York) spent \$32.30; the State with the lowest per capita expenditure for this purpose (South Dakota) spent about one-fourth this amount, or \$8.06. By far the larger part of these expenditures for health and hospitals went to hospitals; per capita outlays for hospitals (again omitting the District of Columbia) ranged from \$27.62 in New York to \$6.34 in South Dakota. Per capita expenditures for health varied from \$7.93 in Washington to \$1.34 in Iowa.

According to Census Bureau definitions (2), hospital expenditures are the expenditures of State and local governments for the support of hospital facilities (and institutions for the care and treatment of the handicapped) that are established or operated by these governmental units, for the provision of hospital care in private or other governmental hospitals, and for the support of other public or private hospitals. Included are expenditures for hospital facilities operated in conjunction with State colleges or universities as well as payments by the governmental units of hospital bills for the needy and for other classes of the public.

Health expenditures are the amounts spent by State and local governments for public health services and for vendor payments for medical supplies and services, excluding payments for hospital care. Public health services

Table 1. Health and hospital expenditures of State and local governments, 1957

States ranked by 1957 per capita income	Per capita				Total amount (thousands)		
	Personal income	Health and hospital expendi- tures	Hospital expendi- tures	Health expendi- tures	Health and hospital expendi- tures	Hospital expendi- tures	Health expendi- tures
United States.....	\$2, 027	\$18. 80	\$15. 56	\$3. 24	\$3, 202, 107	\$2, 650, 240	\$551, 867
Median State.....	1, 836	16. 04	12. 76	2. 90	34, 815	29, 055	6, 245
States with per capita incomes above U.S. average							
Connecticut.....	\$2, 821	\$23. 00	\$19. 03	\$3. 97	\$52, 171	\$43, 171	\$9, 000
Delaware.....	2, 740	17. 34	14. 28	3. 06	7, 528	6, 199	1, 329
New York.....	2, 578	32. 30	27. 62	4. 68	521, 506	446, 004	75, 502
California.....	2, 523	24. 02	19. 67	4. 35	333, 441	273, 038	60, 403
District of Columbia.....	2, 514	35. 75	30. 53	5. 22	29, 315	25, 035	4, 280
New Jersey.....	2, 504	18. 91	16. 16	2. 75	106, 213	90, 749	15, 464
Illinois.....	2, 447	17. 76	13. 97	3. 79	172, 197	135, 460	36, 737
Nevada.....	2, 423	31. 07	27. 41	3. 66	8, 141	7, 182	959
Massachusetts.....	2, 335	30. 57	24. 70	5. 87	147, 564	119, 244	28, 320
Ohio.....	2, 255	14. 92	12. 40	2. 52	137, 366	114, 144	23, 222
Maryland.....	2, 156	20. 13	16. 38	3. 75	58, 256	47, 413	10, 843
Michigan.....	2, 141	24. 12	20. 77	3. 35	185, 849	160, 051	25, 798
Washington.....	2, 128	22. 57	14. 64	7. 93	61, 506	39, 890	21, 616
Pennsylvania.....	2, 112	14. 89	12. 12	2. 77	163, 921	133, 475	30, 446
Wyoming.....	2, 038	24. 97	21. 93	3. 04	7, 918	6, 953	965
States with per capita incomes below U.S. average							
Indiana.....	\$2, 010	\$16. 38	\$14. 61	\$1. 77	\$73, 793	\$65, 826	\$7, 967
Colorado.....	1, 996	16. 95	14. 57	2. 38	28, 180	24, 230	3, 950
Rhode Island.....	1, 990	17. 65	13. 91	3. 74	15, 125	11, 918	3, 207
Missouri.....	1, 940	14. 26	12. 42	1. 84	60, 452	52, 648	7, 804
Wisconsin.....	1, 920	19. 39	16. 79	2. 60	74, 853	64, 813	10, 040
Oregon.....	1, 914	15. 94	10. 72	5. 22	27, 777	18, 683	9, 094
Montana.....	1, 896	13. 08	10. 41	2. 67	8, 772	6, 982	1, 790
New Hampshire.....	1, 862	23. 42	17. 30	6. 12	13, 417	9, 912	3, 505
Minnesota.....	1, 850	23. 45	19. 58	3. 87	77, 821	64, 984	12, 837
Florida.....	1, 836	19. 43	15. 32	4. 11	81, 805	64, 492	17, 313
Nebraska.....	1, 818	14. 13	12. 55	1. 58	20, 301	18, 032	2, 269
Iowa.....	1, 806	14. 08	12. 74	1. 34	39, 209	35, 469	3, 740
Texas.....	1, 791	11. 36	9. 66	1. 70	104, 193	88, 631	15, 562
Kansas.....	1, 787	17. 21	14. 91	2. 30	36, 133	31, 304	4, 829
Arizona.....	1, 750	12. 00	9. 11	2. 89	12, 935	9, 823	3, 112
Utah.....	1, 694	12. 63	9. 59	3. 04	10, 605	8, 052	2, 553
New Mexico.....	1, 686	17. 18	13. 17	4. 01	13, 964	10, 706	3, 258
Vermont.....	1, 665	15. 39	11. 01	4. 38	5, 693	4, 073	1, 620
Maine.....	1, 663	13. 33	10. 34	2. 99	12, 521	9, 710	2, 811
Virginia.....	1, 660	13. 82	10. 92	2. 90	52, 914	41, 820	11, 094
Idaho.....	1, 630	16. 04	12. 76	3. 28	10, 340	8, 227	2, 113
Oklahoma.....	1, 619	11. 69	9. 77	1. 92	26, 377	22, 049	4, 328
Louisiana.....	1, 566	16. 26	13. 51	2. 75	49, 866	41, 424	8, 442
West Virginia.....	1, 554	9. 18	7. 50	1. 68	18, 021	14, 729	3, 292
South Dakota.....	1, 531	8. 06	6. 34	1. 72	5, 588	4, 396	1, 192
North Dakota.....	1, 435	13. 57	9. 88	3. 69	8, 756	6, 375	2, 381
Georgia.....	1, 431	19. 27	16. 27	3. 00	72, 683	61, 354	11, 329
Tennessee.....	1, 383	14. 59	11. 89	2. 70	50, 251	40, 915	9, 306
Kentucky.....	1, 372	9. 92	7. 76	2. 16	30, 206	23, 627	6, 579
Alabama.....	1, 324	11. 02	9. 05	1. 97	34, 815	28, 601	6, 214
North Carolina.....	1, 317	12. 74	10. 62	2. 12	56, 946	47, 473	9, 473
South Carolina.....	1, 180	14. 16	12. 27	1. 89	33, 523	29, 055	4, 468
Arkansas.....	1, 151	10. 34	8. 51	1. 83	18, 409	15, 143	3, 266
Mississippi.....	958	10. 60	7. 72	2. 88	22, 971	16, 726	6, 245

include public health administration, research, nursing, immunization, clinics, and other general health activities (other than "hospital" activities). They include expenditures for such programs as health examinations and inspections, maternal and child health, school health activities of health departments (but not of school departments), control of cancer, tuberculosis, and mental illness, and other categorical and environmental health activities.

The expenditures reported here are financed from revenue and borrowing, including as revenue amounts received in the form of grants-in-aid from the Federal Government, patient fees, and rental revenues, as well as taxes.

Table 1 shows the per capita expenditures and the dollar amounts for health and hospital services for each State. The States are listed in the order of per capita personal income. Connecticut is at the top, with a per capita income of \$2,821, and Mississippi is at the bottom with a per capita income of \$958.

The median State had a per capita income of \$1,836. The median per capita expenditure for health and hospitals combined was \$16.04; for hospitals it was \$12.76, and for health, \$2.90. In general, States with high per capita incomes reported above-average State and local outlays for health and hospitals combined and for hospitals. The correlation between per capita income and per capita expenditure for health services is less marked.

Of the total \$3.2 billion spent for health and hospitals, \$1.7 billion represents the expenditures of State governments and \$1.5 billion the expenditures of local governments. The amounts expended by State governments varied from \$236 million in New York to slightly less than \$2 million in Nevada. Local government expenditures for this function ranged from a high of \$285 million in New York to a low of \$311,000 in Delaware (table 2).

Although for the United States as a whole, State governments and local governments were about equally responsible for health and hospital expenditures, in 30 States the expenditures of the State government exceeded those of the local governments. In eight States the expenditures of the State government accounted for 80 percent or more of the health and hospital

outlays. At the other extreme, in three States the expenditures of the State government accounted for less than 30 percent of the total health and hospital expenditures (table 3).

No geographic pattern is evident in the division of health and hospital program responsibilities between State governments and local governments. For example, in California local governments spent 63 cents of each dollar, but in Washington and Oregon, only 39 and 29 cents respectively. In New York about 55 cents of each dollar represents local expenditures, and in New Jersey the figure is 61 cents, but in Connecticut, it is only 15 cents. In Georgia local governments spent 66 percent of the total health and hospital expenditures; in Alabama, 56 percent; in Mississippi, 49 percent; in Arkansas, 40 percent; and in Louisiana, 19 percent (table 3).

A total of \$111 million of Federal aid went to State governments to finance these health and hospital expenditures. State governments granted \$253 million to local governmental units for these functions, and \$60 million of local funds was paid to State governments as reimbursement for services performed by the States for localities.

Federal grants to State governments for health and hospital programs ranged from \$8 million in Texas to \$366,000 in Delaware. State aid to local governments ranged from a high of \$73 million in New York to a low of \$16,000 in Maine and New Hampshire. Local governments in 35 States made payments to their respective State governments for health and hospitals ranging from almost \$12 million in New Jersey to \$1,000 in Texas (table 2).

For the United States as a whole (exclusive of the District of Columbia), Federal funds accounted for 3.5 percent of the total expenditures for health and hospitals. In New York Federal funds represented less than 1 percent, but in Alabama and Arkansas they represented 13.8 percent of the total. In 33 States, the proportion of Federal funds exceeded the average of 3.5 percent, and in 19 States it exceeded twice this average. In general, Federal funds accounted for a larger proportion of program outlays in the agricultural and low-income States than in the industrial, high-

Table 2. State and local expenditures for health and hospitals and transfers of funds between governments, 1957
[Thousands of dollars]

States ranked by 1957 per capita income	Final spending unit			Intergovernmental transfer of funds		
	Total	State	Local	From Federal to State	From local to State	From State to local
United States.....	\$3, 202, 107	\$1, 652, 288	\$1, 549, 819			
United States exclusive of District of Columbia.....	3, 172, 792	1, 652, 288	1, 520, 504	¹ \$111, 202	\$60, 264	\$253, 072
States with per capita incomes above U.S. average						
Connecticut.....	\$52, 171	\$44, 436	\$7, 735	\$969	0	\$254
Delaware.....	7, 528	7, 217	311	366	0	0
New York.....	521, 506	236, 037	285, 469	4, 499	\$858	73, 151
California.....	333, 441	123, 216	210, 225	4, 939	2, 507	15, 667
New Jersey.....	106, 213	41, 838	64, 375	1, 490	11, 657	4, 837
Illinois.....	172, 197	105, 819	66, 378	3, 472	251	10, 958
Nevada.....	8, 141	1, 850	6, 291	665	59	267
Massachusetts.....	147, 564	79, 799	67, 765	1, 473	406	29, 818
Ohio.....	137, 366	72, 995	64, 371	3, 857	3, 766	3, 522
Maryland.....	58, 256	42, 628	15, 628	1, 893	2, 612	1, 460
Michigan.....	185, 849	93, 026	92, 823	4, 534	6, 466	13, 361
Washington.....	61, 506	37, 356	24, 150	1, 061	0	9, 231
Pennsylvania.....	163, 921	137, 357	26, 564	6, 438	0	5, 246
Wyoming.....	7, 918	2, 175	5, 743	578	13	234
States with per capita incomes below U.S. average						
Indiana.....	\$73, 793	\$37, 076	\$36, 717	\$2, 075	\$947	\$7, 134
Colorado.....	28, 180	16, 102	12, 078	1, 272	0	571
Rhode Island.....	15, 125	13, 059	2, 066	953	0	200
Missouri.....	60, 452	24, 610	35, 842	2, 417	1, 110	1, 580
Wisconsin.....	74, 853	21, 493	53, 360	1, 426	2, 138	16, 089
Oregon.....	27, 777	19, 708	8, 069	690	0	88
Montana.....	8, 772	5, 888	2, 884	629	0	49
New Hampshire.....	13, 417	8, 339	5, 078	471	25	16
Minnesota.....	77, 821	33, 598	44, 223	3, 382	2, 219	17, 097
Florida.....	81, 805	34, 396	47, 409	3, 146	3, 680	3, 194
Nebraska.....	20, 301	13, 860	6, 441	614	5, 174	147
Iowa.....	39, 209	19, 489	19, 720	1, 752	9, 802	807
Texas.....	104, 193	52, 513	51, 680	8, 059	1	1, 370
Kansas.....	36, 133	23, 143	12, 990	1, 441	0	3, 910
Arizona.....	12, 935	5, 133	7, 802	732	0	788
Utah.....	10, 605	4, 934	5, 671	1, 018	100	479
New Mexico.....	13, 964	8, 322	5, 642	1, 830	51	526
Vermont.....	5, 693	4, 861	832	369	0	0
Maine.....	12, 521	10, 253	2, 268	610	61	16
Virginia.....	52, 914	40, 928	11, 986	2, 484	924	1, 904
Idaho.....	10, 340	4, 868	5, 472	1, 243	209	436
Oklahoma.....	26, 377	18, 796	7, 581	2, 146	301	362
Louisiana.....	49, 866	40, 460	9, 406	3, 210	0	2, 344
West Virginia.....	18, 021	10, 261	7, 760	1, 717	218	416
South Dakota.....	5, 588	3, 918	1, 670	566	935	137
North Dakota.....	8, 756	7, 945	811	640	423	95
Georgia.....	72, 683	24, 783	47, 900	5, 442	0	7, 137
Tennessee.....	50, 251	21, 316	28, 935	3, 828	2, 347	2, 204
Kentucky.....	30, 206	14, 419	15, 787	2, 130	40	1, 868
Alabama.....	34, 815	15, 363	19, 452	4, 811	761	5, 465
North Carolina.....	56, 946	30, 845	26, 101	5, 270	123	4, 168
South Carolina.....	33, 523	13, 045	20, 478	3, 015	54	3, 010
Arkansas.....	18, 409	11, 017	7, 392	2, 547	7	805
Mississippi.....	22, 971	11, 798	11, 173	3, 033	19	634

¹ Excludes approximately \$2 million Federal grants to local governments.

Table 3. Percentage distribution of health and hospital expenditures between State and local governments by final spending unit and source of funds, 1957

States ranked by 1957 per capita income	Final spending unit		Source of financing (after allowance for intergovernmental transfers)		
	State	Local	Federal	State	Local
United States, exclusive of District of Columbia.....	52.1	47.9	1 3.5	54.7	41.8
States with per capita incomes above U.S. average					
Connecticut.....	85.2	14.8	1.8	83.9	14.3
Delaware.....	95.9	4.1	4.9	91.0	4.1
New York.....	45.3	54.7	0.9	58.2	40.9
California.....	37.0	63.0	1.5	39.4	59.1
New Jersey.....	39.4	60.6	1.4	31.6	67.0
Illinois.....	61.5	38.5	2.0	65.7	32.3
Nevada.....	22.7	77.3	8.2	17.1	74.7
Massachusetts.....	54.1	45.9	1.0	73.0	26.0
Ohio.....	53.1	46.9	2.8	50.2	47.0
Maryland.....	73.2	26.8	3.3	67.9	28.8
Michigan.....	50.1	49.9	2.4	51.3	46.3
Washington.....	60.7	39.3	1.7	74.0	24.3
Pennsylvania.....	83.8	16.2	3.9	83.1	13.0
Wyoming.....	27.5	72.5	7.3	23.0	69.7
States with per capita incomes below U.S. average					
Indiana.....	50.2	49.8	2.8	55.8	41.4
Colorado.....	57.1	42.9	4.5	54.7	40.8
Rhode Island.....	86.3	13.7	6.3	81.4	12.3
Missouri.....	40.7	59.3	4.0	37.5	58.5
Wisconsin.....	28.7	71.3	1.9	45.4	52.7
Oregon.....	71.0	29.0	2.5	68.8	28.7
Montana.....	67.1	32.9	7.2	60.5	32.3
New Hampshire.....	62.2	37.8	3.5	58.6	37.9
Minnesota.....	43.2	56.8	4.4	57.9	37.7
Florida.....	42.0	58.0	3.8	37.6	58.6
Nebraska.....	68.3	31.7	3.0	40.5	56.5
Iowa.....	49.7	50.3	4.5	22.3	73.2
Texas.....	50.4	49.6	7.7	44.0	48.3
Kansas.....	64.0	36.0	4.0	70.9	25.1
Arizona.....	39.7	60.3	5.7	40.1	54.2
Utah.....	46.5	53.5	9.6	40.5	49.9
New Mexico.....	59.6	40.4	13.1	49.9	37.0
Vermont.....	85.4	14.6	6.5	78.9	14.6
Maine.....	81.9	18.1	4.9	76.6	18.5
Virginia.....	77.3	22.7	4.7	74.5	20.8
Idaho.....	47.1	52.9	12.0	37.3	50.7
Oklahoma.....	71.3	28.7	8.1	63.4	28.5
Louisiana.....	81.1	18.9	6.4	79.2	14.4
West Virginia.....	56.9	43.1	9.5	48.5	42.0
South Dakota.....	70.1	29.9	10.1	45.7	44.2
North Dakota.....	90.7	9.3	7.3	79.7	13.0
Georgia.....	34.1	65.9	7.5	36.4	56.1
Tennessee.....	42.4	57.6	7.6	34.5	57.9
Kentucky.....	47.7	52.3	7.1	46.7	46.2
Alabama.....	44.1	55.9	13.8	43.8	42.4
North Carolina.....	54.2	45.8	9.3	52.0	38.7
South Carolina.....	38.9	61.1	9.0	38.8	52.2
Arkansas.....	59.8	40.2	13.8	50.7	35.5
Mississippi.....	51.4	48.6	13.2	40.8	46.0

¹ Excludes less than 1 percent Federal grants to local governments.

Table 4. Percentage distribution of general expenditures of State and local governments by major functions, 1957

States ranked by 1957 per capita income	Education	Highways	Public welfare	Health and hospitals	All other
United States.....	35.0	19.3	8.4	7.9	29.4
United States, exclusive of District of Columbia.....	35.0	19.4	8.4	7.0	29.3
States with per capita incomes above U.S. average					
Connecticut.....	29.1	32.9	5.4	7.1	25.5
Delaware.....	39.9	21.6	5.3	7.1	26.1
New York.....	30.0	13.1	7.4	10.9	38.6
California.....	37.2	14.5	9.1	7.5	31.7
District of Columbia.....	21.0	8.6	6.3	15.8	48.3
New Jersey.....	33.3	16.3	4.3	8.0	38.1
Illinois.....	34.3	19.3	7.2	7.8	31.4
Nevada.....	25.9	24.2	4.2	8.5	37.2
Massachusetts.....	24.1	21.0	10.6	10.5	33.8
Ohio.....	36.3	20.5	7.9	6.7	28.6
Maryland.....	32.5	23.0	4.0	8.4	32.1
Michigan.....	40.2	18.0	6.2	9.2	26.4
Washington.....	36.0	20.0	10.6	7.9	25.5
Pennsylvania.....	36.0	16.6	7.2	7.6	32.6
Wyoming.....	36.5	28.3	5.3	7.6	22.3
States with per capita incomes below U.S. average					
Indiana.....	43.3	18.0	5.8	7.9	25.0
Colorado.....	36.4	19.1	15.8	6.0	22.7
Rhode Island.....	29.1	17.4	10.4	8.4	34.7
Missouri.....	33.4	19.4	15.2	7.2	24.8
Wisconsin.....	32.1	22.3	7.6	8.0	30.0
Oregon.....	38.8	21.3	6.9	5.9	27.1
Montana.....	36.0	28.0	7.4	4.6	24.0
New Hampshire.....	29.8	30.3	6.7	9.6	23.6
Minnesota.....	39.2	20.8	8.3	9.1	22.6
Florida.....	30.1	20.7	7.1	8.2	33.9
Nebraska.....	38.7	25.3	6.7	7.0	22.3
Iowa.....	38.9	27.7	8.9	6.0	18.5
Texas.....	39.5	21.5	8.4	5.6	25.0
Kansas.....	33.5	30.2	8.2	6.3	21.8
Arizona.....	41.9	18.4	6.5	4.4	28.8
Utah.....	45.2	17.7	7.9	5.4	23.8
New Mexico.....	39.3	23.9	7.3	6.2	23.3
Vermont.....	34.3	30.0	8.4	6.2	21.1
Maine.....	30.6	27.6	9.1	6.4	26.3
Virginia.....	36.3	25.5	3.6	7.4	27.2
Idaho.....	35.0	25.7	7.4	6.9	25.0
Oklahoma.....	35.6	21.7	18.7	4.7	19.3
Louisiana.....	31.3	18.1	16.6	5.9	28.1
West Virginia.....	40.9	19.5	11.4	5.9	22.3
South Dakota.....	34.9	32.2	6.7	3.3	22.9
North Dakota.....	31.8	28.5	6.3	5.2	28.2
Georgia.....	36.7	16.9	11.1	10.4	21.9
Tennessee.....	36.0	21.6	9.0	8.9	21.5
Kentucky.....	36.0	22.1	11.0	6.4	24.5
Alabama.....	31.6	24.4	12.9	6.2	24.9
North Carolina.....	40.4	20.9	7.4	7.9	23.4
South Carolina.....	43.4	16.4	8.1	9.1	23.0
Arkansas.....	35.5	23.2	13.0	7.0	21.3
Mississippi.....	33.8	25.6	11.6	7.0	22.0

income States (table 3), reflecting the grant allocation formulas used for the Hill-Burton hospital construction program and public health programs.

For most States, the proportion of State aid to local governments does not affect the division of program responsibilities between State and local governments. Over the Nation, State aid to local governments for health and hospitals amounted to \$253 million, or 17 percent of local outlays for this function. In California, where local expenditures are a relatively high proportion of the total, State aid to localities is relatively low (7.5 percent). In contrast, in Wisconsin, where localities also make a high proportion of the health and hospital expenditures, State aid finances 30 percent of these expenditures. In several States where local expenditures are comparatively low (for example, Pennsylvania, Louisiana, and Kansas), State aid finances 20 to 30 cents of each \$1 of local expenditures.

In only three States (Massachusetts, Minnesota, and Washington) does the proportion of State aid exceed twice the national average. In two States (Delaware and Vermont) there is no State aid to local governments, and in 13 other States less than 5 percent of the local expenditures were financed by State aid.

Although the expenditures for health and hospitals according to the final spending unit are about evenly divided between State and local governments, local funds account for less than half (42 percent) of the total financing. The local share of funds ranges from 4 percent in Delaware to 75 percent in Nevada. In only three States in addition to Nevada (Iowa, New Jersey, and Wyoming) is the local share as much as 60 percent of the total. In 34 States, local funds account for less than half the total health and hospital expenditures.

The four governmental functions of education, highways, public welfare, and health and hospitals accounted for 71 percent of the total \$40.4 billion State-local general expenditures. The remaining 29 percent covered all the other functions of the State and local governments, such as police and fire protection, tax enforcement, legislative and judicial expense, sanitation, conservation of natural resources, recreation, correction, housing and community redevelopment, employment security administration, and interest on the general debt.

Education accounted for the largest proportion of State and local expenditures in all but two States; highway expenditures generally ranked second. Expenditures for public welfare and for health and hospitals usually ranked third and fourth. The States varied widely in the proportion of expenditures devoted to each function. Exclusive of the District of Columbia, education expenditures ranged from 45 percent of general expenditures in Utah to 24 percent in Massachusetts; highways varied from 33 percent in Connecticut to 13 percent in New York; public welfare, from 19 percent in Oklahoma to slightly less than 4 percent in Virginia; and health and hospitals, from 11 percent in New York to 3 percent in South Dakota.

Table 4 shows for each State the percentage distribution of the expenditures for the four major functions of State and local governments.

REFERENCES

- (1) U.S. Bureau of the Census: 1957 census of governments. State and local government finances in 1957. Advance Releases No. 8. February 1959, 76 pp.
- (2) U.S. Bureau of the Census: Compendium of State government finances in 1957. State finances: 1957. G-SF57-No. 2. Washington, D.C., U.S. Government Printing Office, 1958, 68 pp.

Legal note . . . Health Inspections

Constitutionality of ordinance imposing forfeiture on person refusing entry to health inspector without warrant upheld five to four in first decision by U.S. Supreme Court upon question—State court decisions noted. *Frank v. State of Maryland*, 79 S. Ct. 804 (May 4, 1959).

On February 27, 1958, Sanitarian Gentry, an officer of the bureau of rodent control of the Baltimore City Health Department, acting on a complaint that there were rats in the basement of a neighboring house, went to appellant Frank's private dwelling to make an inspection of the premises. Relying on the authority of section 120 of article 12 of the Baltimore City Code, Gentry did not have a search warrant. That section provides:

"Whenever the Commissioner of Health shall have cause to suspect that a nuisance exists in any house, cellar or enclosure, he may demand entry therein in the daytime, and if the owner or occupier shall refuse or delay to open the same and admit a free examination, he shall forfeit and pay for every such refusal the sum of Twenty Dollars."

Receiving no response to a knock at Frank's door, Gentry inspected the area outside the house and found a pile of straw, trash, and debris, including rodent feces, which he estimated at approximately one-half ton. When approached by Frank to explain his presence, Gentry said that he had evidence of rodent infestation and demanded entry into the house to inspect the basement area. Frank refused to permit entry without a search warrant. The next day Frank was arrested, charged with and found guilty of violating the quoted section of the Baltimore Code, and fined \$20. He appealed to the Maryland Court of Appeals which denied certiorari. (The issue presumably was considered settled by *Givner v. State of Maryland* (see below) in which the State Court had previously upheld the constitutionality of the Baltimore ordinance.)

The case was appealed to the Supreme Court of the United States, the appellant Frank charging that the conviction for resisting an inspection of his house without a warrant had been obtained in violation of the "due process" requirement of the 14th amendment to the Federal Constitution in that it violated his right against unreasonable searches and seizures as guaranteed in the fourth amendment to the Constitution. By a five-to-four decision sustaining the conviction the Supreme Court held the ordinance in question did not violate the due process requirements.

After analysis of the historical background of the 4th and 14th amendments, Justice Frankfurter speaking for the majority concluded that:

"... two protections emerge from the broad constitutional proscription of official invasion. The first of these is the right to be secure from intrusion into personal privacy, the right to shut the door on officials of the State unless their entry is under proper authority of law. The second, and intimately related protection, is self-protection: The right to resist unauthorized entry which has as its design the securing of information to fortify the coercive power of the State against an individual, information which may be used to effect a further deprivation of life or liberty or property."

Evidence of criminal action is placed in this second category and, except for limited situations, seizure of such evidence may not be had without a judicially issued search warrant. Here, however, the Court emphasized, no evidence for criminal prosecution was sought to be seized. The attempted inspection was merely

to determine whether conditions proscribed by the Baltimore health code existed, and if they did the owner or occupier would, under the ordinance, have been directed to correct them—to do what he could have been ordered to do even without an inspection. The Court noted that “appellant’s resistance can only be based, not on admissible self-protection, but on a rarely voiced denial of any official justification for seeking to enter his home. The constitutional ‘liberty’ that is asserted is the absolute right to refuse consent for an inspection designed and pursued solely for the protection of the community’s health, even when the inspection is conducted with due regard for every convenience of time and place.”

Thus, in addition to touching only the periphery of the important interests safeguarded by the 14th amendment’s protection against official intrusion—the right to be secure against unauthorized entry to secure evidence for possible criminal action—the inspection here is hedged with safeguards. Under the Baltimore Code, reasonable grounds for suspicion of the existence of a nuisance must exist, the inspection must be made in the daytime, and though a fine may be imposed for failure to allow an inspector in, officials may not enter forcibly.

The Court traced a long history of Maryland laws empowering inspections without warrants, and pointed to the 1801 ordinance of the City of Baltimore in which such a power of inspection became an instrument in the enforcement of the Baltimore health laws. Many thousands of inspections were made under this and similar authority, the Court noted, and the decision quoted with favor from an earlier opinion by Justice Holmes to stress the significance of this long history.

“The Fourteenth Amendment, itself a historical production, did not destroy history for the States and substitute mechanical compartments of law all exactly alike. If a thing has been practiced for two hundred years by common consent, it will need a strong case for the Fourteenth Amendment to affect it. . . .”

The Court, however, disavowed any intention by its holding to “freeze” due process “within the confines of historical facts or discredited attitudes.” The necessity for the exercise of the challenged power to inspect without a war-

rant was, however, viewed as still supported by the situation. The Court declared:

“There is a total want of important modification in the circumstances or the structure of the society which calls for a disregard for so much history. On the contrary, the problems which give rise to these ordinances have multiplied manifold, as have the difficulties of enforcement. The need to maintain basic, minimal standards of housing, to prevent the spread of disease and of that pervasive breakdown in the fiber of a people which is produced by slums and the absence of the barest essentials of civilized living, has mounted to a major concern of American government . . . Time and experience have forcefully taught that the power to inspect dwelling places, either as a matter of systematic area-by-area search, or as here, to treat a specific problem, is of indispensable importance to the maintenance of community health; a power that would be greatly hobbled by the blanket requirement of the safeguards necessary for a search of evidence of criminal acts.”

With respect to the view that the legal protection of privacy requires a search warrant in order to comply with “due process,” the Court rejected a suggestion that the warrant appellant considered necessary from a constitutional point of view could be satisfied by a blanket authorization “for periodic inspections.” The Court concluded that:

“If a search warrant be constitutionally required, the requirement cannot be flexibly interpreted to dispense with the rigorous constitutional restrictions for its issue. A loose basis for granting a search warrant for the situation before us is to enter by the way of the back door to a recognition of the fact that by reason of its intrinsic elements, its historic sanctions, and its safeguards, the Maryland proceedings requesting permission to make a search without intruding when permission is denied does not offend the protection of the Fourteenth Amendment.”

Concurring Opinion of Justice Whittaker

Justice Whittaker, in a separate opinion, concurred in the opinion of the Court, holding that the inspection involved did not amount

to an unreasonable search within the 4th and 14th amendments. He emphasized his understanding that the Court's opinion adhered to the principle that the prohibition of the 4th amendment against unreasonable searches applied to the States through the due process clause of the 14th amendment.

The Dissenting View

Justice Douglas, speaking for the minority, read the fourth amendment differently and declared: "The Court misreads history when it relates the Fourth Amendment primarily to searches for evidence to be used in criminal prosecutions." The security of one's privacy against arbitrary intrusion by the police protected by the fourth amendment, the dissent argued, does not exclude invasions for purposes of inspecting sanitary conditions. This would certainly be true with respect to those States where the presence of unsanitary conditions gives rise to criminal prosecutions. Even under the Baltimore City Code in question, since in resisting an attempt to make an inspection without a warrant appellant was invoking a constitutional protection, the imposition of any fine, regardless of amount, the dissent stated, is unconstitutional.

The dissent viewed the protection of the fourth amendment against unreasonable searches and seizures as designed to protect not only criminals, but as a reflection of the common-law right of a man to privacy in his home, unrelated to crime or suspicion of crime. They pointed to historical applications of this right in a wider frame of reference than only criminal prosecutions, and argued, further, that the more restricted application of the fourth amendment by the Court's decision had no basis in reason (quoting from, *District of Columbia v. Little*, 178 F. 2d 13, 17, affirmed on other grounds, 339 U.S. 1—see below): "To say that a man suspected of crime has a right to protection against search of his home without a warrant, but that a man not suspected of crime has no such protection, is a fantastic absurdity."

The dissent pointed out that the appellant sought to keep the inspector out only until a warrant was obtained. None was sought. In the view of the dissenters, the case was a poor

one to dispense with a need for a warrant since evidence necessary to obtain one was abundant—the extreme decay and the pile of filth. The dissent went on to say that the test of "probable cause" required by the fourth amendment before a search warrant may be issued may take into account the nature of the search being sought, for example, "considerations of health and safety." This approach, the opinion declared, was not to sanction synthetic search warrants but to recognize that the showing of a probable cause in a health case might have quite different requirements than one required in a graver situation.

State Decisions Noted

Although those cases were not before it, the Supreme Court decision in *Frank* reflects support for recent holdings of the Maryland and Ohio Supreme Courts. In *Givner v. State*, 210 Md. 484, 124 A. 2d 764 (1956), the Maryland Supreme Court, in upholding the constitutionality of the same Baltimore provision under attack in the *Frank* case, held that reasonable searches are not barred by the Federal or Maryland constitutions. An inspection without a warrant for the purpose of protecting the public health and safety, that court held, does not fall within the constitutional proscription against searches for evidence of crime. Under the ordinance in question, the court noted, and as the U.S. Supreme Court reemphasized in *Frank*, that the owner of a dwelling is ordered merely to correct the violations. Prosecution can only then be undertaken for failure to do so. The Maryland court concluded that the case fell within one of the suggested intermediate, constitutional areas in which governing agencies may lawfully provide for general routine inspections at reasonable hours without search warrants.

The Ohio Supreme Court made a similar determination with respect to a Dayton ordinance requiring the owner of a dwelling to grant free access thereto at any reasonable hour to a housing inspector for the purpose of conducting a health inspection in *State v. Price*, 151 N.E. 2d 523 (1958). In holding the ordinance constitutional the court noted that, under the provisions of the ordinance, before an owner could be forced to open his premises a court order would

have to be obtained. Similarly, where contemplated, prosecution for the violation of a final order would have to be based on evidence obtained at a reinspection, or at least at some time subsequent to the original inspection if it had been made without a warrant. Thus, the question of the use of evidence obtained without a warrant was held not before the court, and the issue was merely whether the inspection authorized by the ordinance constituted an unreasonable search.

In *District of Columbia v. Little*, 178 F. 2d 13 (D.C. Cir., 1949), the Circuit Court of Appeals in a two-to-one decision reversed a conviction under a District of Columbia law imposing a fine for a houseowner's "interference" with a health inspection and held that the fourth amendment prohibits such a search without a warrant. On appeal to the Supreme Court of the United States, the *Little* decision was

affirmed, 339 U.S. 1 (1950), but on nonconstitutional grounds, the Court determining that defendant's action in refusing entry did not constitute an "interference" within the meaning of the applicable District of Columbia Act.

NOTE: On June 8, 1959, 79 S. Ct. 978, by a vote of four to four (one Justice abstaining) the Supreme Court of the United States noted probable jurisdiction in *State ex rel Eaton v. Price* (discussed under "State decisions" above). As pointed out in the memorandum by Justice Clark (who objected to this action), this case is apparently "on all fours" with the *Frank* case "except that the penalty provision in Maryland's Act is \$20, while that of Ohio's law is a maximum of \$200, or a jail sentence not exceeding 30 days." The case will probably be set for argument in the 1959-1960 term of the Court.

—SIDNEY EDELMAN, assistant chief, Public Health Division, Office of General Counsel, Department of Health, Education, and Welfare.

Correction

In the paper, "Poliomyelitis in the United States, 1957," *Public Health Reports*, vol. 74, June 1959, p. 536, table 1 should be replaced by the following:

Table 1. Total national poliomyelitis incidence, 1935-57

Year	Cases	Rate per 100,000	Year	Cases	Rate per 100,000
1935.....	10,839	8.5	1947.....	10,827	7.5
1936.....	4,523	3.5	1948.....	27,726	19.1
1937.....	9,514	7.4	1949.....	42,033	28.4
1938.....	1,705	1.3	1950.....	33,300	22.0
1939.....	7,343	5.6	1951.....	28,386	18.6
1940.....	9,804	7.4	1952.....	57,879	37.2
1941.....	9,086	6.8	1953.....	35,592	22.5
1942.....	4,167	3.0	1954.....	38,476	23.9
1943.....	12,450	9.3	1955.....	28,985	17.6
1944.....	19,029	14.3	1956.....	15,140	9.1
1945.....	13,624	10.3	1957.....	5,485	3.2
1946.....	25,698	18.4			

SOURCES: Reported cases, 1935-50, from U.S. National Office of Vital Statistics: Vital Statistics—Special Reports, vol. 37, No. 9, June 15, 1953; 1951-57, from U.S. National Office of Vital Statistics: Annual Supplement, Morbidity and Mortality Weekly Report, vol. 6, No. 53, Oct. 29, 1958, p. 4, table 1. Rates based on Bureau of the Census mid-year population estimates.

Milk Sanitation Honor Roll for 1957-59

Fifty communities have been added to the Public Health Service milk sanitation "honor roll," and 64 communities on the previous list have been dropped. This revision covers the period from July 1, 1957, to June 30, 1959, and includes a total of 289 cities and 97 counties.

Communities on the honor roll have complied substantially with the various items of sanitation contained in the milk ordinance recommended by the U.S. Public Health Service (PHS Publication No. 229: "Milk Ordinance and Code—1953 Recommendations of the Public Health Service"). The State milk sanitation authorities concerned report this compliance to the Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk are sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 490 counties and 1,424 municipalities. The ordinance also serves as the basis for the regulations of 35 States and Hawaii. In 15 States and Hawaii it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication

This compilation is from the Milk and Food Program, Division of Engineering Services of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, March 1959, pp. 277-280. The rating method was described in Public Health Reports 53: 1386 (1938); reprint No. 1970.

of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they are more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

The rules for inclusion of a community on the honor roll are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service recommended milk ordinance. (A departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included on the list unless both its pasteurized milk and its retail raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the retail raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "cleanup campaigns," it is suggested that, when the rating of a community on the list falls below 90 percent, no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk-control district, or the State. (In the absence of such an official program, there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary period shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating	Community	Date of rating	Community	Date of rating
<i>Colorado</i>		<i>Indiana—Continued</i>		<i>Kentucky—Continued</i>	
Boulder County.....	8-1958	Holland.....		Glasgow.....	1-17-1959
Colorado Springs.....	12-13-1957	Huntingburg.....		Greenville.....	1-21-1958
Denver.....	8-27-1957	Jasper.....		Hardinsburg and Breck-	
Las Animas-Huerfano		Tell City.....		inridge County.....	10-22-1958
Counties.....	4-22-1958	Elkhart, Goshen, Nappa-		Hodgenville.....	10-20-1958
Pueblo County.....	2-13-1958	nee area.....	12-5-1957	Hopkinsville and Chris-	
Weld County.....	10-24-1957	Evansville.....	6-5-1958	tian County.....	9-26-1957
		Fort Wayne.....	7-15-1958	Lawrenceburg and An-	
<i>District of Columbia</i>		Indiana Falls City		derson County.....	6-5-1958
Washington.....	3-6-1958	area:.....	10-16-1957	Leitchfield and Grayson	
		Jeffersonville.....		County.....	10-10-1957
<i>Georgia</i>		New Albany.....		Liberty.....	11-18-1958
Albany.....	12-5-1958	Salem.....		Louisville and Jefferson	
Athens.....	5-8-1959	Scottsburg.....		County.....	3-1958
Atlanta.....	8-23-1957	Lafayette and W. Lafay-		Mayfield and Graves	
Augusta.....	5-23-1959	ette.....	5-5-1958	County.....	5-6-1959
Bainbridge.....	3-25-1958	Logansport.....	3-27-1958	Maysville.....	7-23-1957
Cairo.....	5-7-1958	Madison.....	7-23-1958	Monticello.....	6-19-1958
Calhoun-Gordon County..	8-12-1958	Marion County.....	4-2-1958	Morehead.....	2-3-1959
Canton.....	10-30-1958	Michigan City.....	4-23-1958	Morganfield and Union	
Columbus.....	1-23-1959	Monticello.....	10-16-1958	County.....	1-21-1958
Douglas County.....	7-25-1958	Muncie.....	5-20-1958	Morgantown.....	1-10-1958
Fitzgerald.....	5-27-1959	New Castle.....	4-24-1958	Murray and Calloway	
Griffin.....	11-14-1957	North Manchester.....	12-16-1958	County.....	2-5-1958
La Grange.....	10-8-1958	Pern.....	10-30-1958	Newport and Campbell	
Moultrie.....	10-29-1958	Rochester.....	9-17-1958	County.....	10-18-1957
Paulding County.....	7-25-1958	South Bend.....	12-11-1957	Owensboro.....	5-9-1958
Quitman.....	8-13-1958	Union City.....	7-3-1957	Owenton.....	3-31-1958
Savannah.....	7-18-1958	Vincennes.....	10-3-1957	Paducah and McCracken	
Valdosta.....	3-12-1958	Warsaw.....	8-15-1958	County.....	5-1-1959
Waycross.....	3-14-1958			Paris and Bourbon	
		<i>Iowa</i>		County.....	1-1958
<i>Illinois</i>		Cedar Rapids.....	10-9-1958	Pendleton County.....	4-2-1958.
East Side Health Dis-		Davenport.....	7-24-1958	Pike County.....	7-22-1958
trict:.....	6-5-1958	Des Moines.....	7-3-1958	Prestonsburg and Floyd	
Brooklyn.....		Dubuque.....	6-20-1958	County.....	7-22-1958
Cahokia.....		Frankfort.....	2-10-1959	Shelby County.....	1-17-1958
East St. Louis.....		Iowa City.....	10-9-1958	Smithland and Living-	
Fairmont City.....		Kokomo.....	2-10-1959	ston County.....	2-7-1958
National City.....				Taylorsville and Spencer	
Washington City.....		<i>Kentucky</i>		County.....	6-30-1958
Elgin.....	9-19-1958	Benton and Marshall		Webster County.....	5-22-1958
Peoria.....	4-17-1958	County.....	2-6-1958		
		Bowling Green and War-		<i>Mississippi</i>	
<i>Indiana</i>		ren County.....	5-14-1959	Amory.....	5-7-1959
Anderson.....	12-3-1958	Butler and Falmouth.....	4-2-1958	Booneville.....	5-6-1959
Berne-Bluffton area.....	10-17-1958	Campbellsville.....	2-13-1959	Brookhaven.....	1-15-1958
Bloomington.....	1-10-1958	Cynthiana and Harrison		Canton.....	9-30-1958
Bremen.....	1-29-1958	County.....	4-8-1958	Clarksdale.....	12-17-1958
Columbia City.....	6-20-1958	Danville and Boyle		Columbia.....	8-7-1958
Cooperative Grade A		County.....	4-1958	Columbus.....	7-16-1958
area:.....	2-13-1958	Elizabethtown.....	1-8-1958	Corinth.....	4-9-1959
		Frankfort.....	10-18-1957	Greenville.....	10-21-1958

Milk Sanitation Honor Roll for 1957-59

Fifty communities have been added to the Public Health Service milk sanitation "honor roll," and 64 communities on the previous list have been dropped. This revision covers the period from July 1, 1957, to June 30, 1959, and includes a total of 289 cities and 97 counties.

Communities on the honor roll have complied substantially with the various items of sanitation contained in the milk ordinance recommended by the U.S. Public Health Service (PHS Publication No. 229: "Milk Ordinance and Code—1953 Recommendations of the Public Health Service"). The State milk sanitation authorities concerned report this compliance to the Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk are sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 490 counties and 1,424 municipalities. The ordinance also serves as the basis for the regulations of 35 States and Hawaii. In 15 States and Hawaii it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication

This compilation is from the Milk and Food Program, Division of Engineering Services of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, March 1959, pp. 277-280. The rating method was described in Public Health Reports 53: 1386 (1938); reprint No. 1970.

of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they are more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

The rules for inclusion of a community on the honor roll are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service recommended milk ordinance. (A departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included on the list unless both its pasteurized milk and its retail raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the retail raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "cleanup campaigns," it is suggested that, when the rating of a community on the list falls below 90 percent, no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk-control district, or the State. (In the absence of such an official program, there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary period shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Texas—Continued</i>		<i>Virginia—Continued</i>		<i>Wisconsin—Continued</i>	
Plainview	10- 8-1958	Christiansburg	8- 7-1958	Burlington	12-11-1958
Port Arthur	10-23-1957	Colonial Heights	11- 7-1958	Clintonville	2-11-1958
San Angelo	8- 8-1957	Lynchburg	4-14-1959	Delavan	12-11-1958
San Antonio	3- 6-1959	Norfolk	6- 5-1958	Eau Claire	2- 3-1959
San Benito	2-12-1958	Petersburg	11- 7-1958	Elkhorn	12-11-1958
Sherman	10-31-1957	Portsmouth	3-27-1959	Fontana	12-11-1958
Texarkana	12-10-1957	Pulaski	8- 7-1958	Fort Atkinson	12-11-1958
Tyler	9-26-1958	Radford	8- 7-1958	Green Bay	10-11-1957
Victoria	1-19-1959	Richmond	4-18-1958	Kaukauna	1- 6-1959
Wichita Falls	12-16-1958	Roanoke	7- 3-1958	Kenosha	7- 5-1957
		Staunton	4- 4-1958	La Crosse	8-26-1958
		Waynesboro	12- 5-1957	Lake Geneva	12-11-1958
<i>Utah</i>				Madison	11-29-1957
Logan	5-22-1958			Milwaukee	8-28-1957
Ogden	10-30-1957	<i>Washington</i>		Neenah-Menasha	12- 2-1958
Salt Lake City	5- 6-1958	Spokane	10-29-1958	Oshkosh	7- 9-1958
Utah County	11-29-1957	Whitman County	10-17-1958	Ripon	2-13-1959
				Sheboygan	7-26-1957
				Stevens Point	2-19-1959
				Waupun	2-13-1959
				Williams Bay	12-11-1958
<i>Virginia</i>		<i>Wisconsin</i>			
Abingdon	11- 7-1957	Appleton	1-13-1959		
Blacksburg	8- 7-1958	Beaver Dam	2-13-1959		
Bristol	11- 7-1957	Beloit	1-23-1958		

BOTH RAW AND PASTEURIZED MARKET MILK

<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>
<i>Georgia</i>		<i>Missouri</i>		<i>Texas</i>	
Americus, 94.9	8-25-1958	Joplin, 91.4	2- 5-1958	Abilene, 90	10-10-1957
Carrollton, 99.8	2-12-1959			Brenham, 95.5	7-11-1958
Cedartown, 96.9	8-31-1957	<i>North Carolina</i>		Brownsville, 98.7	3-12-1958
Gainesville, 95.6	9-19-1958	Buncombe County, 98.7	4- 1-1958	Hereford, 96	3-27-1959
Rome, 99.1	10-16-1957	Cleveland County, 91.8	9-11-1958	Marshall, 98.8	4-23-1959
Thomasville, 96.3	6-24-1958	Gaston County, 97.9	7-19-1957	Palestine, 99.2	10- 2-1957
Toccoa, 97.4	12-19-1958	Robeson County, 98	3-11-1958		
Washington, 99.87	2-25-1959	Wake County, 99.9	1-27-1958	<i>Virginia</i>	
		Wilkes County, 99.48	5- 8-1958	Charlottesville, 99.6	9-27-1957
<i>Kentucky</i>				<i>Washington</i>	
Madisonville and Hopkins County, 99	12-11-1958			Benton and Franklin Counties, 99.7	9-25-1958
Somerset and Pulaski County, 96	8-29-1958	<i>Oklahoma</i>			
		Lawton, 99.5	1-15-1959		
<i>Mississippi</i>		<i>Tennessee</i>		<i>West Virginia</i>	
Biloxi, 99	3-28-1958	Harriman, 95	4- 2-1958	Kanawha County, 99.3	8-29-1958
Gulfport, 99	3-27-1958	Kingston, 96.5	4- 2-1958	Monongalia County, 97.8	8- 9-1957

NOTE: In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90 percent or more compliance with the grade A raw

milk requirements, of the milk ordinance recommended by the United States Public Health Service.

Notice particularly the percentage of the milk pasteurized in the various communities listed. This percentage is an important factor to

consider in estimating the safety of a city's milk supply. All milk should be pasteurized, whether commercially or at home, before it is consumed.

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Mississippi—Continued</i>		<i>North Carolina—Continued</i>		<i>Tennessee—Continued</i>	
Grenada	9-24-1957	Hertford County	7-31-1958	Kingsport	1-30-1958
Hattiesburg	5-16-1958	Iredell County	7- 1-1958	Knoxville-Knox County ..	9-25-1957
Hernando	12-19-1958	Jackson County	3-19-1959	Lewisburg	6- 9-1958
Houston	4-15-1959	Lenoir County	4- 7-1959	Lexington	10-30-1958
Iuka	4- 8-1959	Lincoln County	1- 9-1959	Livingston	1- 7-1959
Jackson	3-26-1959	Macon County	3-19-1959	Loudon	5-26-1958
Kosciusko	6-12-1958	Martin County	8-13-1958	Manchester	10-15-1958
Laurel	5-20-1958	Mecklenburg County	3- 7-1958	Memphis	3-24-1958
Louisville	8-18-1958	Moore County	5-15-1958	Milan	11-11-1958
Macon	2-26-1958	New Hanover County	4-21-1958	Morristown	7-10-1958
Meadville	2-25-1959	Northampton County	7-31-1958	Mountain City	10-28-1958
Meridian	2-27-1958	Orange County	8-13-1957	Mount Pleasant	5-19-1958
New Albany	10-10-1957	Pasquotank County	5- 2-1958	Murfreesboro	8-14-1957
Oxford	8-27-1957	Pender County	3- 2-1959	Nashville-Davidson Coun-	
Picayune	10-30-1957	Perquimans County	5- 2-1958	ty	10-28-1957
Starkville	2-10-1959	Person County	8-13-1957	Newbern	11-18-1958
State College	2-11-1959	Pitt County	4- 1-1958	Newport	1- 7-1958
Tupelo	1-27-1959	Richmond County	7-30-1958	Paris	9- 4-1958
Vicksburg	1-27-1959	Rocky Mount	2-27-1958	Pulaski	9-12-1957
West Point	7-15-1958	Sampson County	5-22-1958	Rogersville	1-29-1958
<i>Missouri</i>		Scotland County	11-22-1957	Sparta	4-18-1958
Kansas City	6-11-1958	Stanley County	9-10-1958	Sweetwater	9-23-1958
St. Joseph	4-14-1958	Swain County	3-19-1959	Trenton	11- 5-1958
St. Louis	11-26-1957	Transylvania County	10-20-1958	Tulahoma	10-13-1958
St. Louis County	6- 4-1958	Tyrrell County	2- 6-1958	Waverly	8-26-1958
Sedalia	8- 7-1957	Union County	12- 4-1958	Winchester	10-16-1958
Sikeston	2-11-1958	Washington County	2- 6-1958	<i>Texas</i>	
Springfield	5-13-1958	Wayne County	1-27-1958	Amarillo	4-14-1959
<i>Nebraska</i>		Wilson County	1-27-1958	Big Springs	12-14-1957
Lincoln	7-16-1958	<i>Ohio</i>		Borger	6-27-1958
Omaha	2-19-1958	Lima	10- 1-1957	Bryan	10- 5-1957
<i>New Mexico</i>		<i>Tennessee</i>		Burkburnett	1-14-1958
Albuquerque	9-11-1958	Athens	9-25-1958	Cleburne	1-17-1958
<i>North Carolina</i>		Bristol	11- 7-1957	College Station	10- 5-1957
Alexander County	1- 9-1959	Chattanooga - Hamilton		Corpus Christi	5-11-1959
Beaufort County	5-14-1959	County	10- 9-1958	Dallas	11-17-1958
Bertie County	2- 7-1958	Clarksville	2- 7-1958	Denison	10-30-1957
Bladen County	4- 9-1958	Cleveland	5- 8-1958	Edinburg	3-14-1958
Camden County	5- 2-1958	Clinton	9-16-1958	El Paso	2-13-1958
Catawba County	1- 9-1959	Columbia	5-19-1958	Falfurrias	2-15-1958
Chatham County	8-13-1957	Cookeville	4-18-1958	Galveston	6-27-1958
Chowan County	5- 2-1958	Covington	12-12-1958	Grand Prairie	11-28-1958
Craven County	8-30-1957	Cowan	10-16-1958	Greenville	12-12-1958
Cumberland County	3-28-1958	Decherd	10-16-1958	Harlingen	2-15-1958
Durham County	4-22-1958	Diyersburg	11-18-1958	Houston	6-13-1958
Edgecombe County	5-21-1958	Erwin	10-30-1958	Jacksonville	12-17-1958
Forsyth County	12-12-1958	Fayetteville	6-10-1958	Kingsville	5- 6-1959
Gates County	7-31-1958	Franklin	5-15-1958	Lubbock	8-14-1958
Guilford County	6-18-1958	Greeneville	1-28-1958	Lufkin	7- 9-1958
Halifax County	9-13-1957	Humboldt	11- 5-1958	McAllen	3-14-1958
Harnett County	10-15-1958	Huntingdon	10-28-1958	Midland	12-14-1957
Haywood County	3-14-1958	Jackson-Madison Coun-		Odessa	12-14-1957
Henderson County	10-20-1958	ty	10-14-1958	Paris	2- 4-1959

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Texas—Continued</i>		<i>Virginia—Continued</i>		<i>Wisconsin—Continued</i>	
Plainview	10- 8-1958	Christiansburg	8- 7-1958	Burlington	12-11-1958
Port Arthur	10-23-1957	Colonial Heights	11- 7-1958	Clintonville	2-11-1958
San Angelo	8- 8-1957	Lynchburg	4-14-1959	Delavan	12-11-1958
San Antonio	3- 6-1959	Norfolk	6- 5-1958	Eau Claire	2- 3-1959
San Benito	2-12-1958	Petersburg	11- 7-1958	Elkhorn	12-11-1958
Sherman	10-31-1957	Portsmouth	3-27-1959	Fontana	12-11-1958
Texarkana	12-10-1957	Pulaski	8- 7-1958	Fort Atkinson	12-11-1958
Tyler	9-26-1958	Radford	8- 7-1958	Green Bay	10-11-1957
Victoria	1-19-1959	Richmond	4-18-1958	Kaukauna	1- 6-1959
Wichita Falls	12-16-1958	Roanoke	7- 3-1958	Kenosha	7- 5-1957
		Staunton	4- 4-1958	La Crosse	8-26-1958
		Waynesboro	12- 5-1957	Lake Geneva	12-11-1958
<i>Utah</i>				Madison	11-29-1957
Logan	5-22-1958			Milwaukee	8-28-1957
Ogden	10-30-1957	<i>Washington</i>		Neenah-Menasha	12- 2-1958
Salt Lake City	5- 6-1958	Spokane	10-29-1958	Oshkosh	7- 9-1958
Utah County	11-29-1957	Whitman County	10-17-1958	Ripon	2-13-1959
				Sheboygan	7-26-1957
<i>Virginia</i>		<i>Wisconsin</i>		Stevens Point	2-19-1959
Abingdon	11- 7-1957	Appleton	1-13-1959	Waupun	2-13-1959
Blacksburg	8- 7-1958	Beaver Dam	2-13-1959	Williams Bay	12-11-1958
Bristol	11- 7-1957	Beloit	1-23-1958		

BOTH RAW AND PASTEURIZED MARKET MILK

<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>
<i>Georgia</i>		<i>Missouri</i>		<i>Texas</i>	
Americus, 94.9	8-25-1958	Joplin, 91.4	2- 5-1958	Ablene, 90	10-10-1957
Carrollton, 99.8	2-12-1959			Brenham, 95.5	7-11-1958
Cedartown, 96.9	8-31-1957	<i>North Carolina</i>		Brownsville, 98.7	3-12-1958
Gainesville, 95.6	9-19-1958	Buncombe County, 98.7	4- 1-1958	Hereford, 96	3-27-1959
Rome, 99.1	10-16-1957	Cleveland County, 91.8	9-11-1958	Marshall, 98.8	4-23-1959
Thomasville, 96.3	6-24-1958	Gaston County, 97.9	7-19-1957	Palestine, 99.2	10- 2-1957
Toccoa, 97.4	12-19-1958	Robeson County, 98	3-11-1958		
Washington, 99.87	2-25-1959	Wake County, 99.9	1-27-1958	<i>Virginia</i>	
		Wilkes County, 99.48	5- 8-1958	Charlottesville, 99.6	9-27-1957
<i>Kentucky</i>				<i>Washington</i>	
Madisonville and Hopkins County, 99	12-11-1958			Benton and Franklin Counties, 99.7	9-25-1958
Somerset and Pulaski County, 96	8-29-1958	<i>Oklahoma</i>			
		Lawton, 99.5	1-15-1959	<i>West Virginia</i>	
<i>Mississippi</i>		<i>Tennessee</i>		Kanawha County, 99.3	8-29-1958
Biloxi, 99	3-28-1958	Harriman, 95	4- 2-1958	Monongalia County, 97.8	8- 9-1957
Gulfport, 99	3-27-1958	Kingston, 96.5	4- 2-1958		

NOTE: In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90 percent or more compliance with the grade A raw

milk requirements, of the milk ordinance recommended by the United States Public Health Service.

Notice particularly the percentage of the milk pasteurized in the various communities listed. This percentage is an important factor to

consider in estimating the safety of a city's milk supply. All milk should be pasteurized, whether commercially or at home, before it is consumed.

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959—Con.
100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Mississippi—Continued</i>		<i>North Carolina—Continued</i>		<i>Tennessee—Continued</i>	
Grenada	9-24-1957	Hertford County	7-31-1958	Kingsport	1-30-1958
Hattiesburg	5-16-1958	Iredell County	7- 1-1958	Knoxville-Knox County ..	9-25-1957
Hernando	12-19-1958	Jackson County	3-19-1959	Lewisburg	6- 9-1958
Houston	4-15-1959	Lenoir County	4- 7-1959	Lexington	10-30-1958
Iuka	4- 8-1959	Lincoln County	1- 9-1959	Livingston	1- 7-1959
Jackson	3-26-1959	Macon County	3-19-1959	Loudon	5-26-1958
Kosciusko	6-12-1958	Martin County	8-13-1958	Manchester	10-15-1958
Laurel	5-20-1958	Mecklenburg County	3- 7-1958	Memphis	3-24-1958
Louisville	8-18-1958	Moore County	5-15-1958	Milan	11-11-1958
Macon	2-26-1958	New Hanover County	4-21-1958	Morristown	7-10-1958
Meadville	2-25-1959	Northampton County	7-31-1958	Mountain City	10-28-1958
Meridian	2-27-1958	Orange County	8-13-1957	Mount Pleasant	5-19-1958
New Albany	10-10-1957	Pasquotank County	5- 2-1958	Murfreesboro	8-14-1957
Oxford	8-27-1957	Pender County	3- 2-1959	Nashville-Davidson Coun-	
Picayune	10-30-1957	Perquimans County	5- 2-1958	ty	10-28-1957
Starkville	2-10-1959	Person County	8-13-1957	Newbern	11-18-1958
State College	2-11-1959	Pitt County	4- 1-1958	Newport	1- 7-1958
Tupelo	1-27-1959	Richmond County	7-30-1958	Paris	9- 4-1958
Vicksburg	1-27-1959	Rocky Mount	2-27-1958	Pulaski	9-12-1957
West Point	7-15-1958	Sampson County	5-22-1958	Rogersville	1-29-1958
		Scotland County	11-22-1957	Sparta	4-18-1958
<i>Missouri</i>		Stanley County	9-10-1958	Sweetwater	9-23-1958
Kansas City	6-11-1958	Swain County	3-19-1959	Trenton	11- 5-1958
St. Joseph	4-14-1958	Transylvania County	10-20-1958	Tullahoma	10-13-1958
St. Louis	11-26-1957	Tyrrell County	2- 6-1958	Waverly	8-26-1958
St. Louis County	6- 4-1958	Union County	12- 4-1958	Winchester	10-16-1958
Sedalia	8- 7-1957	Washington County	2- 6-1958		
Sikeston	2-11-1958	Wayne County	1-27-1958	<i>Texas</i>	
Springfield	5-13-1958	Wilson County	1-27-1958	Amarillo	4-14-1959
				Big Springs	12-14-1957
<i>Nebraska</i>				Borger	6-27-1958
Lincoln	7-16-1958			Bryan	10- 5-1957
Omaha	2-19-1958			Burkburnett	1-14-1958
		<i>Ohio</i>		Cleburne	1-17-1958
<i>New Mexico</i>		Lima	10- 1957	College Station	10- 5-1957
Albuquerque	9-11-1958			Corpus Christi	5-11-1959
		<i>Tennessee</i>		Dallas	11-17-1958
<i>North Carolina</i>		Athens	9-25-1958	Denison	10-30-1957
Alexander County	1- 9-1959	Bristol	11- 7-1957	Edinburg	3-14-1958
Beaufort County	5-14-1959	Chattanooga - Hamilton		El Paso	2-13-1958
Bertie County	2- 7-1958	County	10- 9-1958	Falfurrias	2-15-1958
Bladen County	4- 9-1958	Clarksville	2- 7-1958	Galveston	6-27-1958
Camden County	5- 2-1958	Cleveland	5- 8-1958	Grand Prairie	11-28-1958
Catawba County	1- 9-1959	Clinton	9-16-1958	Greenville	12-12-1958
Chatham County	8-13-1957	Columbia	5-19-1958	Harlingen	2-15-1958
Chowan County	5- 2-1958	Cookeville	4-18-1958	Houston	6-13-1958
Craven County	8-30-1957	Covington	12-12-1958	Jacksonville	12-17-1958
Cumberland County	3-28-1958	Cowan	10-16-1958	Kingsville	5- 6-1959
Durham County	4-22-1958	Decherd	10-16-1958	Lubbock	8-14-1958
Edgecombe County	5-21-1958	Dyersburg	11-18-1958	Lufkin	7- 9-1958
Forsyth County	12-12-1958	Erwin	10-30-1958	McAllen	3-14-1958
Gates County	7-31-1958	Fayetteville	6-10-1958	Midland	12-14-1957
Guilford County	6-18-1958	Franklin	5-15-1958	Odessa	12-14-1957
Halifax County	9-13-1957	Greeneville	1-28-1958	Paris	2- 4-1959
Harnett County	10-15-1958	Humboldt	11- 5-1958		
Haywood County	3-14-1958	Huntingdon	10-28-1958		
Henderson County	10-20-1958	Jackson-Madison Coun-			
		ty	10-14-1958		

A Philadelphia center gives the city's senior citizens professional aid in coping with the mental hazards of aging.

A Mental Health Program for the Later Years

JACOB TUCKMAN, Ph.D., and ALICE T. DASHIELL

TODAY'S increased proportion of older people in the population has intensified our interest in more complete understanding of the adult. Society recognizes and accepts the facts of the physical changes with age, but has not recognized fully its economic implications and its social and psychological consequences.

Lessened opportunities for gainful employment, the need to live on a reduced income, the decreased size of the household owing to the dispersion of the family now grown up, widowhood, death of contemporaries, gradual or sudden loss of health, the time and energy costs of traveling or carrying on a hobby, all these and many more problems demand adjustment. Some adults can make such adjustments with great flexibility, but many others do not.

Statistics pertaining to admissions to State hospitals and the age distribution of their resident-patient population indicate the difficulty experienced by some older people in making a

satisfactory adjustment to their day-to-day problems. For the year 1955 in the United States, 26 percent of all first admissions to State hospitals were people 65 years of age and over, and 28 percent of the resident-patient population were in this age group (1).

Community Services

Most older people have the potential for meeting many of their special needs and problems but they may require help at some crucial point. Unfortunately, community services, especially to the nonindigent aged, have not kept pace with the need. Mathiasen has pointed out that in the distribution of funds by community chests and united funds in 255 cities, the amount allocated to care of the aged is at the bottom of the list (2).

Most services for noninstitutionalized older people have taken the form of "golden age clubs" where opportunities for recreation and social contacts are given. Less frequently, activity centers include facilities for arts and crafts, adult education, and cultural interests, in addition to opportunities for recreation and socialization. While golden age clubs and activity centers for older people have been useful as focal points in promoting the welfare of older persons, they have certain shortcomings. They focus only on some needs of the person rather than his total needs. Frequently leaders are untrained in dealing with the pressing prob-

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EXPERIMENTAL LYMPHOCYTIC CHORIOMENINGITIS OF MONKEYS AND MICE PRODUCED BY A VIRUS ENCOUNTERED IN STUDIES OF THE 1933 ST. LOUIS ENCEPHALITIS EPIDEMIC

By CHARLES ARMSTRONG, *Surgeon, United States Public Health Service*, with Pathology by R. D. LILLIE, *Surgeon, United States Public Health Service*

In the transmission from monkey to monkey of infectious materials derived from a fatal case of the 1933 St. Louis epidemic of encephalitis, a virus has been encountered apparently quite distinct from the strains previously isolated in monkeys by Muckenfuss, Armstrong, and McCordock, and subsequently in white mice by Webster and Fite. This virus, which differs from any virus with which the author is familiar, will be designated in this paper, from the pathological picture produced by intracerebral inoculation of monkeys and mice, as the virus of experimental lymphocytic choriomeningitis.

ORIGIN OF THE VIRUS

The virus was encountered during monkey-to-monkey transfer of infection from a patient C.G., who died during the 1933 St. Louis epidemic of what was apparently encephalitis of the type prevailing there, as judged by the symptoms and central nervous system pathology.

HISTORY OF CASE

Case C.G., colored housewife, 42 years of age, resident of St. Louis County, had been in poor health for the preceding 12 years; suffered with chronic constipation and had had an abdominal operation; was said to suffer from diabetes. She had been in usual health during 3 weeks prior to present illness, which began on August 13, 1933, with general malaise—"just sick all over."

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Dr. Charles Armstrong describes for the first time a neurotrophic virus, quite distinct from the 1933 strains of St. Louis encephalitis, but encountered during experimental transmission of those strains. Dr. R. D. Lillie describes the pathology produced by the virus in monkeys and mice.



Handicraft activities in Philadelphia's mental health program for the later years

It is the policy of the center to accept into membership only ambulatory persons able to care for their own physical needs who are sufficiently well oriented mentally to make constructive use of the program. Although publicity has indicated that the program is available to persons 60 years of age and older to prevent confusion about the purpose of the center, admission is open to any adult who can benefit from the program. A number of people in their fifties with problems of aging have been accepted. There are no eligibility requirements with respect to sex, race, ethnic affiliation, or residence within the city. Applicants may be referred from any source or may be self-referred. No charge is made for any service.

Before admission to the center, the applicant goes through an intake process which is limited usually to one interview but may include medical or psychiatric consultation. At the interview, the applicant discusses his problems as he sees them and his views on the center as a

possible source of help. The social worker explains to the applicant the various phases of the center's program and together they select the pertinent services. Many applicants request immediate medical consultation and referral for treatment. Other applicants have expressed unhappiness, anxieties, nervousness, or symptoms which they describe as "break-down." For these men and women, psychiatric consultation is offered and accepted readily. In other cases the important problem is finding full- or part-time employment. Usually, the applicant requests an opportunity to participate in the recreational and social activities.

The only requests for service that have been rejected are from agencies seeking psychiatric diagnostic services for clients who would not be able to participate in the center's program. In such cases, it has been explained that the center operates as a unit, combining recreation with medical, psychiatric, psychological, and case-work services, none of which functions sepa-

lems confronting the older person. And standards of operation are often below normal in terms of physical facilities, program, and staff.

The Philadelphia Plan

To give full recognition to the importance of the whole person in meeting the needs of older people, the Philadelphia Department of Public Health, through its division of mental health, established the Adult Health and Recreation Center as a demonstrational mental health facility designed to serve the following purposes:

1. Provide evaluation, counseling, and supportive services to help older adults understand their own aging as a natural process, to develop satisfying and continuing interests, to promote constructive individual and group relationships, to promote physical and emotional well-being, and to help them understand and adjust to the economic, physiological, and psychological problems associated with aging.

2. Provide training for individuals who plan to work with older people or who are presently engaged in such work.

3. Conduct research and make the center available to educational institutions as a research center to develop a better understanding of the aging process and of the problems and treatment of "normal" older people.

The center, officially opened in the middle of November 1958, is well located. According to the 1950 census of population, more than 6,000 persons 65 years of age and older live within a mile of the center. The median income for a family of five within this area is \$3,100 a year.

While the center offers the range of activities usually available in golden age clubs or other centers for older people, it possesses an unprecedented factor of clinical orientation within the various related professional disciplines of psychiatry, psychology, social work, public health nursing, and general medicine. The center is designed for "normal" older people and is not a treatment center for the physically or mentally ill. The center is open from 8:45 a.m. to 5:15 p.m. Monday through Friday although at present the group program is conducted from 9:30 a.m. to 12:30 p.m. daily. Afternoon activities will be scheduled when funds become available.

A series of afternoon meetings open to the public has been started. The first dealt with the medical problems of men and women past middle age and accident prevention in the later years. Future meetings will be devoted not only to health but also to income maintenance, housing, use of leisure time, mental health, and other aspects of aging. With the help of a consultant in nutrition, consideration is being given to a lunch program.

Because of the experimental nature of the center, emphasis is placed on an intensive service to a limited number of people rather than an attempt to meet the needs of older people on a mass basis. On any one day, the number of people to be served may be limited to about 50, but the decision regarding the optimum size of the group will be made after more experience with the program. However, total enrollment may be as high as 200 to 250 since all participants would not use the center's facilities every day.

The center is operated under the joint sponsorship of Philadelphia's Department of Public Health and Department of Recreation and the Pennsylvania Department of Public Welfare. A group of professional and lay leaders serve as an advisory committee.

Staffing and Policies

A State grant of \$15,000 for the current fiscal year makes it possible to hire a social worker as director of the center, a secretary on a full-time basis, three recreation leaders, and an occupational therapist 15 hours a week, and to meet certain overhead expenses. With the exception of the occupational therapist, the personnel mentioned have been hired. The department of public health has contributed to the program the services of a physician, two psychiatrists, two psychologists, a psychiatric caseworker, and a mental health consultant in public health nursing. With the exception of the general medical practitioner who is at the center 9 hours a week, each of these staff members devotes 3 hours a week to the program. Certain supplies and equipment are also provided by the health department. The department of recreation has made space available for housing the program in its most modern plant, built at a cost of \$1½ million.

gists, the public health nurse, and caseworkers are recorded in detail and filed in the case folder. Separate weekly individual records are kept by the recreation leaders, giving data on attendance, participation in activities, and some statement about the adjustment of the individual in the group. Most of these records are written in longhand and entries are kept brief or checked under appropriate captions.

Two referral resources are of special interest. The first is the Comprehensive Medicine Clinic, the general medical clinic of Temple University Medical Center. This clinic is staffed by senior medical students, with internists, psychiatrists, and social workers as consulting supervisors and teachers. For the most part, the internists and psychiatrists work as teams and the skills in social work are added wherever indicated. This permits measurements of biological, psychiatric, and sociological parameters in patients as indicated and the application of appropriate and multidisciplinary therapies. The Comprehensive Medicine Clinic not only correlates the work of a number of biologically oriented subspecialists but also attempts to understand the patient in his social, psychological, and physiological milieu. The clinic has agreed to accept all individuals referred by the center for inpatient or outpatient care. Fees are on a sliding scale based on the ability of the person to pay. In return, the center has agreed to accept referrals from the clinic of those patients which the clinic's staff feels will benefit from the center program.

The second resource is the Pennsylvania State Employment Service, bureau of employment security, which has agreed to accept referrals of individuals seeking full- or part-time employment. These persons are seen by the older worker specialists in the employment service on an appointment basis for counseling and job placement.

Analyses of Participants

In just under 4 months of operation, 135 applications have been received. Of this number 85 are active participating members, 30 are pending, awaiting intake interviews scheduled but not yet completed, 15 did not keep their ap-

pointment for an intake interview, and 5 were not accepted because they required other services not available in the center or because they were too sick to participate in the program.

In the active membership of 85, 39 are men and 46 women. Included are nine married couples. Only three in the active membership are nonwhite. The members range in age from 52 to 86, with the median at 67.7 years. The distribution by religious affiliation shows 40 Protestants, 24 Catholics, and 21 Jews. Forty-one are married, 31 are widowed, 8 are single and 5 are separated. Most have completed 6, 7, or 8 years of schooling; only four have a high school education and one has had some college training. One is illiterate.

Employment histories show that most have had *stable employment in skilled or semiskilled occupations* while a few were self-employed. Analysis of living arrangements reveals that 42 own their own homes, 20 rent apartments or houses, 16 are living with relatives, and 7 live in roominghouses. Income of the participants is generally limited to OASI benefits but in some cases this is supplemented by small pensions; only five receive public assistance.

Participants reside in all parts of Philadelphia, the majority from outside the immediate area, but recently men and women living in the neighborhood have begun to show an interest in the center's services. Predominantly participants were self-referred as a result of newspaper publicity or were referred by friends. Up to the present time relatively few have been referred by voluntary health and welfare agencies.

Of the 85 active members, 28 have availed themselves of medical consultations, 8 of psychiatric consultation, and 11 of employment counseling. Of the last group, five were referred to the Pennsylvania State Employment Service for job placement for full- or part-time employment. Thirteen have been referred to medical facilities: 10 to the Temple University Comprehensive Medicine Clinic, 1 to another hospital, and 2 to chest X-ray units.

Daily attendance in the group program has been spotty. On some days as many as 30 people attend; on others, just a handful. A variety of factors, some within the center's control and

rately, even though the applicant may begin by using one service in order to find the solution to his particular problem.

When an applicant wishes to avail himself of all the services offered by the center, the caseworker assists him in analyzing his problems and selecting the most urgent aspect or the one for which he is most ready to accept help.

An example illustrates this process. A 65-year-old widow, childless and living alone in her own small home, received only \$57 a month in old-age and survivors insurance benefits and was unwilling to apply for supplemental public assistance because of the attendant State requirement of placing a lien on her property. A history of diabetes and a gangrenous condition of both legs made her usual employment as a laundry worker impractical. Her small income was insufficient to cover the cost of medical care, medication, and adequate diet.

In desperation and nearly at the point of coma, she called the center saying that she had heard of its new hospital services. After the center's functions were explained to her, an appointment for an interview was made. She was aided in keeping it and in returning again for medical consultation. Throughout these contacts, although she insisted she really wanted help in finding employment, she was actually asking for help on the basis of what she thought would be acceptable. Finally she accepted medical advice and referral to a hospital for treatment as a first step. The diabetic condition was so acute that immediate hospitalization was arranged.

From the hospital, the woman, with unmistakable relief in her voice, telephoned the center to express appreciation of its services and was assured that after discharge the center would help her to satisfy her needs for social contacts and part-time employment.

Integration of Skills

The importance of integrating the several professional skills in this new program cannot be too greatly emphasized. Periodic staff meetings, case conferences, and sharing of records to which each of the professional disciplines contributes are helping to define the role of each of the disciplines in the program.

It is evident already that a caseworker is essential to the intake process by enabling the applicant to obtain maximum value from the available services in relationship to his physical and psychological status. The psychiatrist evaluates the applicant's capacity to use the program, and advises the center's staff in helping the individual adjust to the group program. The psychologist may participate in diagnosis and evaluation, through the use of psychological procedures, and in vocational exploration with applicants seeking employment. The general medical practitioner helps these older persons to understand their medical problems, recommends treatment where indicated, and advises the staff on appropriate center activities for individuals with health problems. The public health nurse consultant is helpful in giving advice on self-care required to carry out medical recommendations. The physician and psychiatrists will supervise the occupational therapist when such a person is hired.

The representatives of each discipline act as consultants to the director, contributing to a better understanding of the individual and his needs and, where indicated, making recommendations for referral to appropriate resources in the community. In referrals to medical facilities, existing doctor-patient relationships are not disturbed. As the program develops, it is planned that all the professional disciplines will be utilized in both group discussion and group psychotherapy. The director is responsible for administration and coordination of the program.

The system devised for recordkeeping provides essential information about the older person but at the same time keeps paperwork to a minimum. A registration form, a 5-inch by 8-inch card, is used to record significant information about the individual, including age, sex, race, religion, ethnic background, economic status, employment and health history, and the reason he gives for requesting admission to the program. Simple notes about important factors in his situation and his response to the initial casework interview are written by the worker on the reverse side of the card. For individuals who avail themselves of other services, a case folder is set up. Interviews by psychiatrists, physicians, psycholo-

Stingray Injuries

FINDLAY E. RUSSELL, M.D.

INJURIES inflicted by stingrays are common in several areas of the coastal waters of North America (1-4). Approximately 750 people a year along our coasts are stung by these elasmobranchs. The largest number of stings are reported from southern California, the Gulf of California, the Gulf of Mexico, and the south Atlantic coast (5).

Of 1,097 stingray injuries reported over a 5-year period in the United States (5, 6), 232 were seen by a physician at some time during the course of the recovery of the victim. Sixty-two patients were hospitalized; the majority of these required surgical closure of their wounds or treatment for secondary infection, or both. At least 10 of the 62 victims were hospitalized for treatment for overexuberant first aid care. Only eight patients were hospitalized for the treatment of the systemic effects produced by the venom. There were two fatalities.

Considerable care should be exercised when wading in shallow waters known to be inhabited by stingrays. Stingray injuries usually occur when the unwary victim treads upon the fish while wading in the ocean surf or mud flats of a bay, slough, or river. The fish often buries itself in the sandy or muddy bottom and may remain motionless until stepped upon. The pressure of the foot on the dorsum of the fish provokes him to thrust his tail upward and forward, driving his sting into the foot or leg of the victim. As the sting enters the flesh,

the integumentary sheath surrounding the spine is ruptured and the venom escapes into the victim's tissues. In withdrawing the spine, the integumentary sheath may be torn free and remain in the wound.

Unlike the injuries inflicted by many venomous animals, wounds produced by the stingray may be large and severely lacerated, requiring extensive debridement and surgical closure. A sting no wider than 5 mm. may produce a wound 3.5 cm. long (6), and larger stings may produce wounds 7 inches long (7). Occasionally, the sting itself may be broken off in the wound.

The sting, or caudal spine, is a bilaterally serrated dentinal structure located on the dorsal surface of the animal's tail. The sharp serrations are curved cephalically and as such are responsible for the lacerating effects as the sting is withdrawn from the victim's flesh. The location, size, and number of stings vary with the species, habitat, and age of the fish. The round stingray, now designated as *Urolophus halleri*, which is implicated in the majority of injuries along the southern California coast, has one or more stings of 1.6 to 5.9 cm. long (8). The giant stingray of Australia, *Bathytoshia*, may possess a caudal spine of 42.0 cm. long (9).

The greatest portion of venom is contained within the two ventrolateral grooves of the sting. In the untraumatized state, the sting is incased in an integumentary sheath. The anatomic relationships of the sheath and sting have been described elsewhere (10-12).

Chemical and Zootoxicological Properties

The toxic fractions of the venom are soluble proteins of average molecular weight. They

Dr. Russell is director of the laboratory of neurological research of the College of Medical Evangelists and Los Angeles County Hospital. Basic data in the report were obtained from studies supported by the Office of Naval Research, Dazian Foundation for Medical Research, and the Public Health Service.

others not, appear to account for this. These factors include long travel distance to the center, carfare expense, inclement weather, seasonal illness, morning schedule, location of the center in an area where people are disinclined to use public services, shortage of equipment and supplies, lack of a lunch program, and certain limitations of the building which, though modern and spacious, needs furnishings to give greater warmth and comfort. However, there is every indication that daily attendance will increase as these problems are resolved.

Planned Research

Implicit in this pilot project is the hypothesis that meeting some of an individual's basic needs will result in improved physical and mental health, or at least the prevention of deterioration. Experience and observation already evidence some improvement in the adjustment of those participating in the program, but these subjective judgments need to be supported by more objective evidence.

A study is being planned to test the effectiveness of the program in facilitating the individual's adjustment; this will be undertaken as soon as the program stabilizes. The basic research design will consider three factors: (a) an appraisal of the individual's background, needs, capacities, attitudes, skills, and physical and mental status before entering the program;

(b) an analysis of his participation in the program, stressing the manner in which he performs and relates to others and the reactions of staff and other participants to him; and (c) an analysis and evaluation of the changes that have taken place in his behavior, health, and adjustment after a period of time in the program, such as 6 months or 1 year. Such a study may indicate whether the improvement in the older person comes from the use of former adjustive behavior patterns or by the development of new ones.

It is important to determine whether the improvement is real or superficial and to what extent it is due to relief from loneliness, to an active and regular regimen, or to other factors. It is also important to know what factors motivate individuals to take part in one activity rather than another, what needs are being met by a particular activity or by the program as a whole, how effective the program is in meeting needs, and how the program can be improved.

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PHS Grants for Public Health Schools

The Nation's 11 schools of public health were awarded training grants totaling \$450,000 in the last half of fiscal year 1959 to help overcome a national deficit in trained health personnel. A \$1 million grant fund for the same purpose has been awarded for fiscal year 1960. Legislation authorizing such aid by the Public Health Service was passed in 1958, but no funds were available until a supplemental appropriation was voted in May 1959.

The funds will help the schools extend and improve specialty training in public health for physicians, nurses, engineers, and other personnel employed in Federal, State, and local public health agencies in the United States and in foreign health agencies.

An Early Case History

An early stingray victim was Captain John Smith. Walter Russell, "Gentleman, doctor of physicke," who accompanied Smith as he explored Chesapeake Bay in June 1608, described the encounter in chapter 5, "The Accidents that hapned in the Discovery of the Bay of Chisapeack" of *The Third Booke of The Proceedings and Accidents of the English Colony in Virginia*.

. . . Having finished this discovery (though our victuall was neere spent) he intended to see his imprisonment-acquaintances upon the river of *Rapahanock*, by many called *Toppahanock*, but our bote by reason of the ebbe, chancing to grownd upon a many shoules lying in the entrances, we spyed many fishes lurking in the reedes: our Captaine sporting himselfe by nayling them to the grownd with his sword, set us all a fishing in that manner: thus we tooke more in owne houre then we could eate in a day.

But it chanced our Captaine taking a fish from his sword (not knowing her condition) being much of the fashion of a Thornback, but a long tayle like a ryding rodde, whereon the middest is a most poysoned sting, of two or three inches long, bearded like a saw on each side, which she strucke into the wrest of his arme neere an inch and a halfe: no bloud nor wound was seene, but a little blew spot, but the torment was instantly so extreme, that in foure houres had so swollen his hand, arme and shoulder, we all with much sorrow concluded his funerall, and prepared his grave in an Island by, as himselfe directed: yet it pleased God by a precious oyle Doctor Russell at the first applyed to it when he sounded it with probe, (ere night) his tormenting paine was so well asswaged that he eate of the fish to his supper, which gave no lesse joy and content to us then ease to himselfe. For which we called the island *Stingray Isle* after the name of the fish. . . .

ized cramps, inguinal or axillary pain, and respiratory distress are less frequently reported. Arrhythmias, paresthesias, and convulsions may occur. True paralysis is extremely rare, if it occurs at all. The "paralyses" seen by the author following severe stings were contractures, probably initiated as flexion reflexes stimulated by the intense pain. These contractures were relieved with meperidine hydrochloride.

Treatment

The standard procedure for treatment of stingray injuries is well established (5). As the chief complaint is immediate, intense, localized pain, the treatment will be most successful if the victim initiates it. Injuries to an extremity should be irrigated with the salt water at hand, since much of the venom can be washed from the wound by this step. An attempt should be made to remove the integumentary sheath if it can be seen in the wound. If a properly qualified person is available, he

may apply a constriction band directly above the wound site. The extremity should then be submerged in hot water at as high a temperature as the patient can tolerate without injury for 30 to 90 minutes. The addition of sodium chloride or magnesium sulfate to the hot water is optional.

In many areas of the United States the life-guard services provide the first aid care just described, and the victim usually arrives at the hospital emergency room or physician's office in little acute pain and with few, if any, other complaints. The wound should then be further examined for evidence of the integumentary sheath, debrided, sutured if necessary, and the appropriate antitetanus agents administered. While infections of these wounds are rare in properly treated cases, some physicians routinely give antibiotics. Elevation of the injured extremity is advised.

Irrigation is contraindicated if the sting has entered the abdominal or thoracic cavity, and the patient should be hospitalized. In such cases, the patient should be explored surgically

are extremely labile and rapidly inactivated by heating. Ten amino acids have been identified in the venom. The total nitrogen, carbohydrate, and protein for 100 mg. of the venom has been calculated as 3.1 mg., 3.3 mg., and 24.9 mg. respectively. The intravenous LD₅₀ of the lyophilized venom is estimated at 28.0 mg./kg. of body weight (13).

In addition to the local effects (12), the venom produces changes in the cardiovascular, respiratory, nervous, and urinary systems (5, 14, 15). Low concentrations of the toxin give rise to simple, transient peripheral vasodilatation or vasoconstriction. The most consistent change in the electrocardiographic pattern of cats when small amounts of the venom are injected is bradycardia with an increase in the PR interval, giving a first degree atrioventricular block with but slight change in the blood pressure. Reversal of the small dose effect occurs within 30 seconds following the end of the injection (14, 15).

Larger amounts produce constriction of the arteries and veins as well as the arterioles, and second or third degree atrioventricular block. The second degree block is usually followed by sinus arrest. In addition to the PR interval change, ST, T wave changes indicative of ischemia and, in some animals, true muscle injury are seen (15, 16). Concomitant with these changes is a fall in systemic arterial pressure. It is apparent that the venom affects the normal pacemaker of the heart. Most of the cardiovascular changes revert to normal within 24 hours (5).

Lethal amounts of the venom cause marked vasoconstriction and cardiac standstill of varying durations. All degrees of atrioventricular block as well as defects in intraventricular conduction occur, and if death is not immediate, the rhythm of the normal pacemaker is replaced by one elaborated outside the sino-atrial node. The blood pressure falls rapidly, and the animal dies in complete cardiovascular collapse (5, 14, 15). Concomitant with these changes are alterations in the respiratory and central nervous systems (5, 13). The venom has no effect on neuromuscular conduction (17). Postmortem examination of animals which have survived for 4 days following a lethal dose of

the venom show few gross changes. However pulmonary edema, engorgement of the liver sinusoids, and vascular congestion with tubular epithelial necrosis in the loop of Henle are seen (13).

Diagnosis

Persons stung by stingrays report having received a sharp, painful stab, usually in the foot or leg, while swimming or wading in an area where these animals are present. The pain is usually described as intense or excruciating; it increases in severity during the first 90 minutes following the stinging if treatment is not instituted. The pain is out of proportion to that which might be produced by a nonvenomous fish or by stepping upon a broken bottle or bivalve. "Stingings" by broken bottles are a common occurrence along certain of our coasts, according to the lifeguard services.

Examination reveals either a puncture or a lacerating wound, usually the latter, jagged, bleeding freely, and often contaminated with parts of the stingray's integumentary sheath. The edges of the wound may be discolored, though the discoloration is not usually marked immediately following the injury. However, within 2 hours the discoloration may extend several centimeters from the wound. Subsequent necrosis of this area is not uncommon in untreated cases.

Edema is a constant finding following stingings by these animals. The edema is not as severe as one sees following a rattlesnake bite, but it may persist for several weeks in the untreated case. Syncope, weakness, nausea, nervousness, and sweating are common complaints. Vomiting, diarrhea, tremors, general-



The round stingray *Urolophus halleri*

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films

The Innocent Party

16-mm. film, color, sound, 17 minutes, 1959.

Audience: Students, parents, educators, civic groups, health workers, and the general public.

This film, depicting the problems of teenagers with venereal diseases, documents simply, forthrightly, and in good taste the nature, recognition, cure, and control of syphilis.

Suitable for mixed audiences, it was shown before release to groups of parents, teachers, educators, Catholic and Protestant clergy, public health officials, and teenagers.

The film was produced by the Kansas State Board of Health in cooperation with the Public Health Service. It may be borrowed from the film library of the Communicable

Disease Center, Atlanta, Ga., by high schools, colleges, youth organizations, and civic groups, as well as health departments, and will be offered for sale by an independent contractor.

Information concerning loan or purchase may be obtained from Dr. William J. Brown, Chief, Venereal Disease Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga.

George Washington's River

16-mm. film, color, sound, original music, 28 minutes, cleared for television, 1959.

Audience: Sanitarians, persons interested in conserving natural resources, and the general public.

From a depiction of George Washington's time when he built his home at Mount Vernon "on the finest river in the world," this new water pollution film takes the audience to

present-day scenes of the polluted Potomac. The ugliness of the pollution emanating from the metropolitan area is contrasted with the fresh, clear headwaters of the Potomac. Scenes include national shrines, cherry blossom time at the Tidal Basin, and a long-forgotten bathing beach in Washington.

The film shows how cities and industries can manage their wastes and restore the streams for fishing, boating, swimming, and domestic and industrial requirements.

Film libraries or agencies considering the purchase of a print can obtain a preview copy from the Division of Water Pollution Control, Public Health Service, Washington 25, D.C. Distribution for public showings will be made from film service libraries only.

Prints can be purchased, at \$95.42 each postpaid, from the Motion Picture Service, Office of Information, U.S. Department of Agriculture, Washington 25, D.C.

for the presence of the ray's integumentary sheath (5). Exploration is indicated if the sting has pierced the peritoneum or pleura. Such exploration may require considerable time, since the sheath may be torn into several small pieces. The venom is rapidly absorbed in the peritoneal cavity, and should the offending ray be a large one, the prognosis is poor in the presence of an unremoved sheath. It is also possible for the toxin to be expressed from the venom apparatus without the sheath being left in the wound.

In severe stings, which provoke systemic symptoms, the victim should also be hospitalized. The primary shock often seen immediately following these injuries usually responds to simple supportive measures. If secondary shock develops as a result of the direct effects of the venom, the physician must direct his efforts toward maintaining cardiovascular and respiratory tone. Oxygen should always be given. Meperidine hydrochloride has been found to be effective in controlling the pain (5, 6). Experiments with mice have shown that the drug does not alter the LD₅₀ of the venom (5).

Summary

Injuries inflicted by stingrays are common in several areas of the coastal waters of North America. Approximately 750 people a year along our coasts are stung by these elasmobranchs. About 20 percent of those injured are seen by a physician some time during the course of their recovery; 6 percent are hospitalized.

In the untraumatized state, the sting is encased in an integumentary sheath. The greatest portion of the venom is contained within the ventrolateral grooves of the sting.

The toxic fractions of the venom are soluble proteins of average molecular weight which are extremely labile and rapidly inactivated by heating. While the venom produces changes in the respiratory and central nervous systems, its principal action is on the cardiovascular system.

The chief complaint following a sting by one of these animals is severe pain. Syncope, weakness, nausea, nervousness, and sweating

are common complaints. Vomiting, diarrhea, tremors, generalized cramps, inguinal or axillary pain, and respiratory distress are less frequently reported. Arrhythmias, parasthesias, and convulsions may occur.

Treatment is aimed toward alleviating the pain, preventing complications that may be evoked by the venom, and preventing secondary infections. The following therapy is suggested. Irrigate the wound thoroughly, removing the animal's integumentary sheath if present. Apply a constriction band directly above the wound site until hot water can be prepared. Soak affected part in hot water for 30 to 90 minutes. Debride and close wound as necessary. Administer appropriate antitetanus agent and antibiotic. Keep affected part elevated.

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Hospital Use in Hagerstown

MARGARET D. WEST and RUTH M. RAUP

DURING RECENT DECADES, many changes have taken place in patterns of medical care. Besides new methods of preventing and treating illness and disability, new forms of organizing and financing medical and hospital care have emerged making possible more efficient provision of services and a lighter burden of medical care costs for some individuals. Changes in the character of the population, such as the increase in the proportion of older persons, have altered the relative importance of certain diseases and injuries. What has been the effect of these and other changed conditions on the utilization of hospital care?

Since the early 1920's the Public Health Service has conducted a series of studies on the health status in Hagerstown, Md., a small city selected as representative in demographic characteristics of communities in the eastern United States. Among these studies have been household morbidity surveys, the first conducted in the period 1921-24 (1) and the latest during 1955-57 (2).

The 1955-57 survey showed that most of the hospital care of the surveyed population was provided in the Washington County Hospital in Hagerstown. The same hospital provided most of the hospital care for residents of the area in 1921-24. Because this hospital maintains an excellent index of patient discharges covering both the earlier and the later survey periods, a valuable opportunity was presented for comparison of the city's rates and patterns of hospitalization over an interval of about 35 years.

Methods

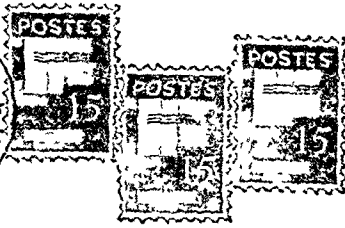
Information on hospitalization in the 1921-24 and 1955-57 surveys was collected by check-

ing the name of each individual in the survey against the discharge records of the Washington County Hospital for the period of his inclusion in the survey. The population surveyed in 1921-24 numbered 9,946 individuals, representing about one-third of the city's total population at that time (28,064 in the 1920 census). The group in 1955-57, about one-twentieth of the total population of 36,260 in the 1950 census, was made up of 1,868 individuals, including 22 who died during the survey period.

As a basis for computing hospitalization rates, the number of individuals surveyed was multiplied by the period of coverage of the individuals to give the total person-years of experience on which information was obtained. In the 1921-24 survey, the total number of person-years of experience reported on was 18,790. Person-years in the more recent survey totaled 2,935, with about half of the individuals covered for 1 year and most of the rest for 2 years.

Both the 1921-24 and 1955-57 survey populations were generally representative of the total Hagerstown population in sex and age distribution, as reported in the 1920 and 1950 censuses. The earlier sample was picked by interviewing all households in sections of the city which represented different economic classes. The 1955-57 sample was drawn at random from households listed in the Hagerstown city directory. Only white households were included in the 1921-24 survey, whereas about 3 percent of the persons surveyed in 1955-57 were Negroes.

Mrs. West is chief of the Health Service Requirements Branch, and Miss Raup, public health research analyst, in the Division of Public Health Methods, Public Health Service.



Medical Center

A national medical center for Korea opened October 2, 1958, in Seoul. The largest modern medical facility in the Far East, the center has 465 beds and was financed with \$2.4 million from UNKRA funds and \$2 million contributed by Norway, Sweden, and Denmark. For its first 5 years of operation the center will have approximately 80 Scandinavian staff members, supported by an annual \$1.5 million contribution from the three countries. The entire facility will be turned over to Korea in 1963.

—ALFRED S. LAZARUS, *chief, Health and Sanitation Division, U.S. Operations Mission, Korea.*

Ojos de Agua

The Ministries of Agriculture, Education, and Health joined forces in a new rural development at Ojos de Agua, a small community in southeastern El Salvador. An earth-cement brick-making machine, used here for the first time, manufactures bricks for a new school, houses, and water supply units. The water units consist of laundries, showers, drinking fountains, watering troughs for animals, and food-washing vats. The community is building approved latrines for each of 420 houses.

—LAMAR A. BYERS and W. C. JAMES, *chief and acting chief, Health and Sanitation Division, U.S. Operations Mission, El Salvador.*

The Well Diggers

Twelve thousand new or rehabilitated wells will be put into operation in East Pakistan this year. The wells will provide a safe source of water. Villagers customarily use open tanks for bathing and laundering as well as for drinking water.

The government of East Pakistan has contracted with 220 small contractors, each with 2 or 3 crews of 4-man gangs, to dig new tube wells or put clogged wells back into service. Most of the wells are less than 200 feet deep. In the Dacca area, 2,294 out of the scheduled 3,370 wells were finished in 30 days.

The village water supply project required nearly 350 miles of 1½-inch galvanized iron pipe, 10,000 hand pumps, 1,000 deep-well hand pumps, and quantities of pipe fittings, strainers, well points, spare parts for the clogged wells, and hand tools.

—ANTHONY DONOVAN, M.D., *chief public health adviser physician, U.S. Operations Mission, Pakistan.*

Tuberculosis in Israel

The number of tuberculosis cases in Israel has dropped so that 750 beds are sufficient for hospitalized tuberculous patients. Other tuberculosis facilities have been converted into general wards, homes for the aged, and mental hospitals.

Ten years ago, when 1,000 immigrants were arriving daily, 12 out of 1,000 had signs of the disease.

Through efforts of the Ministry of Health, trade unions' sick funds, and philanthropic organizations, the number of beds for tuberculosis patients increased from 348 in 1948 to 2,200 by 1953.

Malben, a philanthropic organization, took on the task of rehabilitating discharged patients, totaling 7,000 in 1958 alone.

Malaria in Southeast Asia

To coordinate malaria eradication, 40 officers and technicians from Laos and Thailand met at a border conference at Nongkhai, Thailand, February 2-6, 1959. In 1959 eradication efforts will serve 14 million Thai and 700,000 Lao, an increase of 2 million persons in Thailand and 300,00 in Laos.

In large areas of Thailand the malaria eradication program is almost complete, and less than half of the operational areas require spraying this year. Laos will continue spraying in all operational areas and start surveillance activities in areas of 175,000 population.

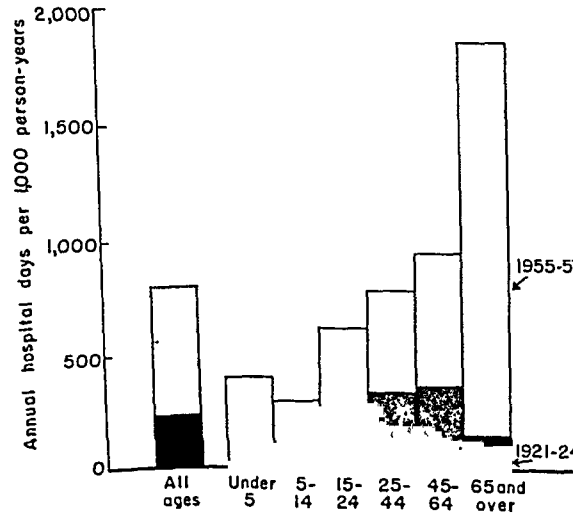
—MELVIN E. GRIFFITH, *acting chief, public health division, U.S. Operations Mission, Thailand.*

Table 1. Hospital admissions per 1,000 person-years of experience of populations surveyed in Hagerstown, Md., 1921-24 and 1955-57, by age group

Age group (years)	1921-24	1955-57	Times increased
Total-----	18	105	5.8
Under 5-----	9	67	7.4
5-14-----	21	58	2.8
15-24-----	23	115	5.0
25-44-----	21	139	6.6
45-64-----	19	87	4.6
65 and over-----	10	134	13.4

sions and in annual hospital days occurred among the youngest and the oldest age groups (table 1, fig. 2). Among children under 5 years, admission rates increased 7 times and annual days 10 times, while the comparable increases for persons 65 years old and over were 13 and 12 times. Each of the intervening age groups, however, also showed increases in hospital care. Among the intervening age groups, increases in admissions tended to exceed increases in total days of care per year. Whereas admission rates rose by amounts ranging from just under three to almost seven times, total days of care in no case increased more than 2 to 2½ times. The differential between the increase in admissions

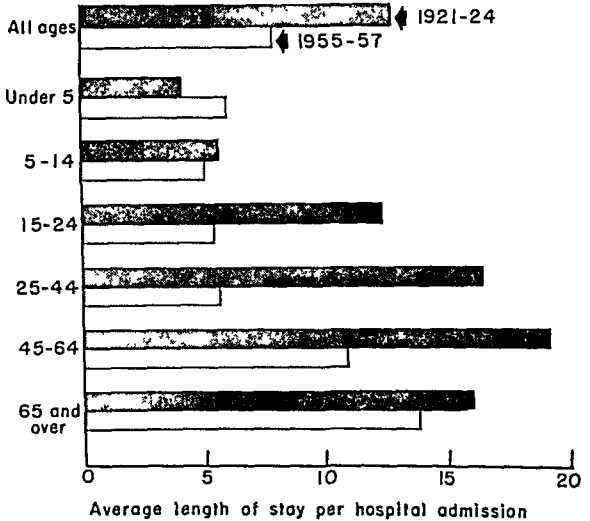
Figure 2. Annual hospital days per 1,000 person-years for populations surveyed in Hagerstown, Md., 1921-24 and 1955-57, by age



and the increase in days of care was greatest among persons 15-24 and 25-44 years old, and least among children 5-14 years of age. These differences reflect variations by age in the extent of change in average length of stay.

Although the average stay for the total survey groups declined about one-third, it decreased as much as two-thirds among persons 25-44 years old (fig. 3). Other age groups experiencing a marked decline were the 15-24 and 45-64. Relatively little change occurred in the shorter average stays of children under 15 or in the longer average stays of persons 65 and over. The small increase in stay among children under 5 can be explained at least in part by a decrease in the share of the caseload admitted for short-stay tonsillectomies.

Figure 3. Average length of stay per hospital admission for populations surveyed in Hagerstown, Md., 1921-24 and 1955-57, by age



Over the past 35 years the proportion of the Hagerstown population in the age groups having the highest hospitalization rates has increased. Between 1921-24 and 1955-57, the proportion of the surveyed population 65 years old or over doubled, rising from one-twentieth to one-tenth. There was an increase also in the second oldest group, 45-64, from about one-sixth to almost one-quarter of the total. The increase in hospitalization rates was sufficiently general among all age groups, however, that the

Hospital Use

Over the past 35 years, patterns of hospitalization in Hagerstown as reflected in use of the Washington County Hospital by the 1921-24 and 1955-57 surveyed populations have changed markedly. Perhaps the most striking change is the increase in hospital admissions and in total days of hospitalization per year.

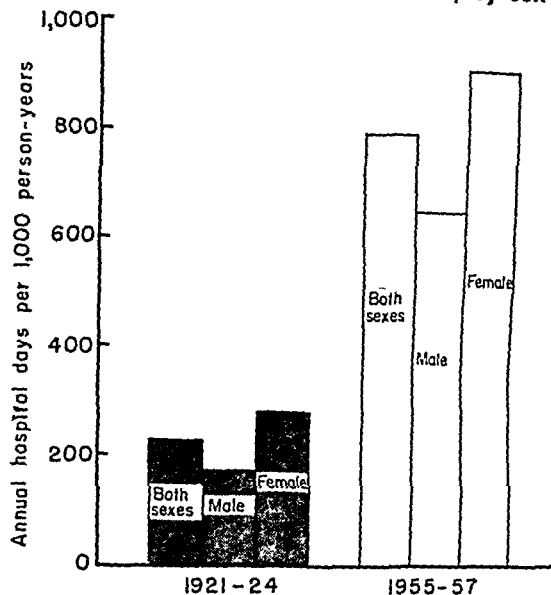
Hospital admissions among the 1955-57 surveyed population occurred at a rate about $5\frac{1}{2}$ times that for the 1921-24 group—105 per 1,000 person-years as compared with 18 per 1,000. Among females, who in both surveys had higher admission rates than males, the size of the increase was even greater—from 21 per 1,000 to 134 per 1,000, or a growth of more than 6 times. Admission rates among men increased about $4\frac{3}{4}$ times, from 15 per 1,000 to 71 per 1,000.

Patients in the more recent period tended to stay for shorter periods than did those admitted 35 years earlier. Whereas in the 1921-24 survey the average length of stay was 12.5 days, by 1955-57 the average had dropped to 7.6 days, a decrease of well over one-third. The decrease was particularly marked among females, whose average stay dropped from 13.2 to 6.9 days. Among males the decrease was proportionately smaller, from 11.5 to 9.2 days.

These decreases, however, only partly offset the increase in admissions in total effect on hospital days per year. So great was the increase in admissions that, despite the one-third decrease in average length of stay, total annual days of hospitalization received by the 1955-57 surveyed population exceeded by more than three times, relatively, the days of care received by the 1921-24 group. As shown in figure 1, the rate increased from 228 days per 1,000 person-years in the earlier period to 797 days in the latter. Among males the rate increased about $3\frac{3}{4}$ times as compared with a $3\frac{1}{3}$ increase in the rate for females.

Only a small part of the increase in hospitalization can be explained by a growth in the proportion of persons admitted more than once during a given year. The number of different individuals hospitalized increased from 17.3 per 1,000 persons to 91.3 per 1,000, or almost as much as the hospital admission rates. The increase in repeated hospitalizations was somewhat greater among females than among males.

Figure 1. Annual hospital days per 1,000 person-years for populations surveyed in Hagerstown, Md., 1921-24 and 1955-57, by sex



Hospitalization rates based on records of the Washington County Hospital slightly understate total hospital use to the extent that in both 1921-24 and 1955-57 certain members of the surveyed populations received all or part of their hospital care in hospitals outside Hagerstown. In the later period, as determined from interview replies, total admission rates, including "outside" hospitalizations, were about 10 percent higher than admission rates for the Washington County Hospital alone. There was some tendency for persons going to "outside" hospitals to stay for longer periods, raising the average length of stay from 7.6 days for Washington County Hospital admissions to 8.2 for all hospitalizations. Although it has not been possible to get similar detail on outside hospitalizations among the 1921-24 population, W. C. Dando, assistant to the administrator of the hospital, is of the opinion that the proportion so receiving care has not changed significantly in the past 35 years.

Variations by Age

Increases in hospitalization rates were found in all age groups, although the size of the increase was greater for some groups than for others. The largest increases both in admis-

Table 3. Hospitalization rates by diagnosis, surveyed population in Hagerstown, Md., 1921-24 and 1955-57

Diagnosis	Hospital admissions per 1,000 person-years		Annual days in hospital per 1,000 person-years	
	1921-24	1955-57	1921-24	1955-57
Total.....	342	307	4,292	2,339
Total rate per 1,000.....	18.2	104.6	228.4	796.9
Infectious and parasitic diseases.....	.6	1.4	15.9	10.9
Tuberculosis.....	.2	0	2.4	0
Typhoid.....	.3	0	12.9	0
Other.....	.1	1.4	.6	10.
Neoplasms, malignant and benign.....	1.0	6.8	21.2	71.2
Respiratory diseases.....	5.0	9.5	19.4	55.2
Pneumonia.....	.5	1.4	6.6	16.0
Tonsils and adenoids.....	3.9	4.4	5.2	6.5
Other.....	.6	3.7	7.6	32.7
Circulatory diseases.....	.2	9.2	2.6	113.5
Heart.....	.2	5.5	2.0	80.5
Other.....	(¹)	3.7	.6	33.0
Digestive diseases.....	3.2	13.3	52.3	121.6
Ulcer and other stomach and duodenum diseases.....	.2	2.4	1.1	22.1
Hernia.....	.3	1.7	3.7	12.3
Gallbladder and bile ducts.....	.4	3.1	6.4	23.9
Appendicitis.....	1.9	2.0	32.5	23.5
Other.....	.4	4.1	8.7	39.9
Genitourinary diseases.....	1.9	19.1	31.6	121.3
Kidney and urinary system.....	.4	7.5	5.3	43.3
Male genital.....	² .3	² 2.0	² 3.1	² 24.5
Female genital.....	² 1.2	² 9.6	² 23.2	² 53.5
Deliveries.....	² 2.4	² 16.0	² 21.3	² 75.0
Accidents, poisonings, violence.....	1.6	5.8	36.0	82.1
Other.....	2.3	23.5	28.0	146.2
Diabetes and other endocrine, nutrition, and metabolic diseases.....	.1	3.1	1.6	32.0
Psychoneuroses and personality disorders.....	.1	3.1	.7	16.4
Vascular lesions and other diseases of the central nervous system.....	.1	1.7	.6	13.3
Diseases of ear and mastoid.....	.4	0	3.5	0
Arthritis, rheumatism, other musculoskeletal diseases.....	.5	1.0	11.8	9.5
Complications of pregnancy and puerperium.....	.7	6.1	6.3	24.9
All other.....	.4	8.5	3.5	50.1

¹ Less than 0.05.

² Rate in relation to total person-years of experience.

mitted to the Washington County Hospital for deliveries at a rate of 7.2 per 1,000; in the 1955-57 population the comparable rate was 71.3 per 1,000, or about 10 times as great. Annual days of hospital care for deliveries increased at a somewhat lesser rate, reflecting an almost two-thirds decrease (from 12.9 to 4.7 days) in the average length of stay for delivery cases.

Birth statistics for the whole of Washington County support the hypothesis that the increase in delivery cases among the surveyed populations was related to a trend toward hospitalization for deliveries rather than to some other factor such as an increase in the birth rate. Between 1921 and 1956 the birth rate in Washington County scarcely changed; actually it decreased slightly. At the same

Table 2. Hospitalization rates¹ among surveyed populations in Hagerstown, Md., with adjustment for change in age composition of population, 1921-24 and 1955-57

Hospitalization	1921-24 surveyed population	1955-57 surveyed population	
		Actual	Age adjusted ²
Annual days of care-----	228.4	796.9	668.1
Admissions-----	18.2	104.6	99.6
Persons hospitalized-----	17.3	91.3	86.0

¹ Per 1,000 person-years.

² Rates expected if population with 1921-24 age composition had been hospitalized at 1955-57 age-specific rates.

increase in age of the 1955-57 population accounts for only a small part of the overall increase in hospitalization. Even if the age composition of the population had stayed constant, as in table 2, annual hospital days relative to population still would have increased almost three times, hospital admission rates about five times, and persons hospitalized more than four times.

Diagnosis

It might be expected that a few outstanding diagnoses or diagnostic groups would account for most of the increase in hospitalization between the 1921-24 and 1955-57 survey periods. Actually there were increases in care, in terms of annual days of hospitalization or hospital admission rates, for practically every diagnosis or diagnostic group studied. This is shown in some detail in figure 4 and table 3.

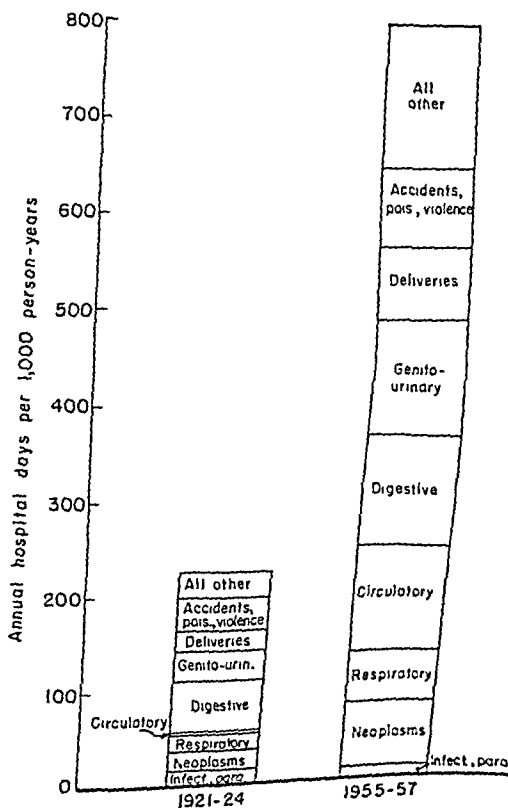
The diagnostic groups showing the largest proportionate increases in hospitalization were circulatory diseases (including heart), genito-urinary disorders, neoplasms, and deliveries. Such other categories as respiratory diseases, diseases of the digestive system, and accidents, however, also accounted for substantial increases in care. The only diagnostic group having a decrease in annual days of care was infectious and parasitic diseases, and this was surprisingly small.

Hospitalization rates for specific diseases or conditions within the diagnostic groups, al-

though based on small numbers of cases, provide similar evidence of a general growth in hospital use. Between the earlier and the later survey periods, only three diseases listed—tuberculosis, typhoid, and mastoiditis—disappeared as causes of hospitalization in this general hospital. Rates of care for appendicitis, tonsillectomies, and arthritis and rheumatism remained about the same or dropped somewhat. For all other diagnoses listed, hospital admissions and annual days of care increased by amounts ranging from twice to more than 50 times. Even pneumonia accounted for 2½ times as many admissions and annual days in 1955-57 as in 1921-24.

Increased hospitalization for the delivery of babies accounts for a significant part of the increase in hospital use among women of childbearing age. In the 1921-24 surveyed population, women 15-44 years old were ad-

Figure 4. Annual hospital days per 1,000 person-years for populations surveyed in Hagerstown, Md., 1921-24 and 1955-57, by diagnosis



1955-56 there were 6.7 deaths in Washington County Hospital for every 1,000 residents of the county, compared with 2.5 per 1,000 in 1922-23, or an increase of about 2½ times over the earlier period. As a proportion of total deaths among county residents, Washington County Hospital deaths rose from 10 percent in 1922-23 to 37 percent in 1955-56. The number of deaths per 1,000 episodes of hospitalization fell by about one-third (from 47.2 to 30.7 per 1,000) in connection with the large increase in hospitalizations that did not terminate in death.

Physician Supply

While hospitalization rates among the surveyed populations increased between 1921-24 and 1955-57, the relative supply of physicians remained about the same. The actual number of physicians in Washington County increased by about one-third, from 59 in 1923 to 82 in 1956, but this increase did little more than keep pace with the increase in the population during the period. The ratio of physicians to population scarcely changed, rising from 99 per 100,000 in 1923 to 104 per 100,000 in 1956. If the comparison is limited to physicians in private practice, the ratio is 99 per 100,000 in both periods. Any increase between 1923 and 1956 was almost entirely confined to physicians in public health, industrial medicine, and other positions distinct from private practice.

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Obstetrics, gynecology.....	0	3
Ophthalmology, otorhinolaryngology.....	4	7
Orthopedic surgery.....	0	1
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SOURCE: Washington County Medical Society and American Medical Association directories.

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Hospitalization, by sex	1921-24	1955-57	Times increased
<i>Admissions</i>			
Females 15-44 years:			
Including deliveries-----	28.7	201.8	7.0
Excluding deliveries-----	21.7	130.5	6.0
Males 15-44 years-----	13.4	52.5	3.9
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¹ Per 1,000 person-years.

time, in the second half of this period alone, the proportion of all Washington County births occurring in a hospital increased about fourfold, rising from 26 percent in 1940 to 97 percent in 1956.

Even among women of childbearing age, however, the trend toward hospitalization for deliveries can be only one of a number of factors explaining the increase in hospital use. If we recompute the admission rates and annual days of care of women in this age group so as to exclude delivery cases, as shown in table 4, we find that over the past 35 years hospitalization for causes excluding deliveries increased almost as much as did hospitalization including deliveries. In both 1921-24 and 1955-57, moreover, women 15-44 years old were hospitalized at rates well above those of men in the same age category, whether or not deliveries are included.

Illness and Death Rates

Changes in hospitalization patterns can be expected to be related in part to changes in patterns of morbidity and mortality in the community. In Hagerstown, the incidence of certain chronic diseases is reported to have risen. There have been increases also in the proportion of persons dying from chronic illnesses and in the proportion of people dying in the hospital.

Because both the 1921-24 and the 1955-57 surveys had as their primary objective the measurement of illness rates, it is possible to compare changes in hospitalization rates with changes in reported sickness rates, at least for selected chronic conditions. Among the illnesses compared, the most common pattern of change was one of increase in both hospitalization and illness rates but the increase in hospitalization was greater. Thus the rate at which heart disease was reported in 1955-57 was approximately twice that for 1921-24, but during the same period hospital admissions and annual hospital days for this diagnosis rose 25 and 40 times respectively.

Evidence of change in causes of death in Hagerstown is found in death reports for the whole of Washington County in the years 1922 and 1956. Although the resident death rate for all causes showed only a slight decline (from 11.6 to 10.0 per 1,000 population), there was a noticeable shift from acute toward chronic illness in the cause of death, as shown in table 5. Infant death rates also were down by about two-thirds. Although information on deaths in other age groups is not available for years as early as 1922, between 1930 and 1956 alone the proportion of total deaths occurring among persons under 15 years of age declined from 15 to 8 percent, and the proportion among persons 45 years and over increased from 67 to 84 percent.

Deaths in the hospital in Hagerstown have increased in relation to total population although they have decreased in relation to the number of admissions to the hospital. In

Table 5. Resident death rates in Washington County, Md., by selected cause, 1922 and 1956

Cause	1922	1956
Deaths per 1,000 population-----	11.6	10.0
Typhoid and diphtheria-----	.2	0
Diarrhea and enteritis-----	.7	0
Pneumonia and influenza-----	1.0	.2
Disease of early infancy-----	.8	.4
Cancer-----	.9	1.5
Diseases of the heart-----	2.0	4.4
All other-----	6.0	3.5
Infant deaths per 1,000 live births--	85.4	29.0

SOURCE: Maryland State Health Department.

1955-56 there were 6.7 deaths in Washington County Hospital for every 1,000 residents of the county, compared with 2.5 per 1,000 in 1922-23, or an increase of about 2½ times over the earlier period. As a proportion of total deaths among county residents, Washington County Hospital deaths rose from 10 percent in 1922-23 to 37 percent in 1955-56. The number of deaths per 1,000 episodes of hospitalization fell by about one-third (from 47.2 to 30.7 per 1,000) in connection with the large increase in hospitalizations that did not terminate in death.

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the number of patients admitted and total annual patient days, increased faster than did the ratio of beds to population. While the ratio of beds to population increased $2\frac{1}{2}$ times, hospital admissions increased almost seven times and the total annual patient days approximately quadrupled.

Second, the proportions of the hospital's available beds that were in use on any given day tended to be higher in the later period than in the earlier. In 1922-23 the average daily census represented about two-thirds of available beds. The 1955-56 average occupancy, in contrast, was about four-fifths of capacity.

In the later survey period, the availability in Washington County of some nursing home care may have slightly relieved the pressure for long-term hospital care of chronically ill or convalescing patients. Nursing homes were practically unknown in the county in the 1920's. In 1956-57, according to current State plans under the hospital and medical facilities construction (Hill-Burton) program, the county had 327 nursing home beds, with 250 admissions per year.

Socioeconomic Factors

Possible relationships between increased hospitalization rates and changes in socioeconomic status can be measured only in general terms, since there is no comparative information on the occupational and educational characteristics of the surveyed populations, and only a few such data for the population of Hagerstown as a whole. In Hagerstown, as in most other urban areas of the United States, the proportion of the working force in professional, technical, and related occupations has increased. More women are working. Educational levels have risen. These and other socioeconomic changes, which conform generally with national trends, have established a basis for increased popular appreciation of the value and convenience of hospitalization as compared with home care of the sick and injured. At the same time, throughout this period Hagerstown's basic character as a relatively self-sufficient trading center whose principal industries are manufacturing and railroading has remained substantially the same.

Insurance

Other studies have shown a relationship between hospital utilization and hospital insurance coverage. It is possible that in recent years the growth of insurance coverage has encouraged some people in Hagerstown to make greater use of the hospital than would have been made without such insurance. While the earlier Hagerstown survey was conducted before the establishment of the first hospital prepayment plan in the United States, by 1955-57 an estimated three-fifths of all Washington County Hospital patients had insurance and about three-fifths of the total bill to patients was being paid for by insurance. The average cost of care in the Washington County Hospital is about six times higher today than it was 35 years ago, having risen from \$3.15 per patient-day in 1923 to \$18.30 in 1956. This high cost of hospitalization has virtually required the development of insurance or some other means of spreading the financial burden over a wider segment of the population.

Related Findings

In overall magnitude the hospitalization rates for the surveyed populations in Hagerstown are roughly comparable to those found in similar populations of the same general time periods. The 1955-57 rates agree closely with rates found in the 1956 Public Health Service survey of general hospital use in the Nation, conducted by the Census Bureau (3). The Hagerstown survey's admission rate of 104.6 per 1,000 population, adjusted to 114.5 per 1,000 to include hospitalizations outside the Washington County Hospital, compares with a Public Health Service-Census survey rate of 117 per 1,000 for nonmetropolitan places with populations of 10,000 to 50,000. Average length of stay for the Hagerstown surveyed population (including outside hospitalization) was just over 8 days, ranging from 5 days to 14 days from the youngest to the oldest age groups. The average stay for cities of comparable size, as found in the Service's survey, was 7.2 days. While comparative information is not readily available for the earlier survey period, the use of the Washington County Hospital among the

1921-24 survey population was roughly similar in amount to the use of that hospital by the population of Washington County as a whole in 1922. Thus, annual days of hospital care in relation to population were only slightly higher for the county population than for the surveyed population. For both the Washington County residents and the 1921-24 surveyed population, average length of stay in the Washington County Hospital was about 12 days.

Summary and Conclusions

Two household morbidity surveys conducted by the Public Health Service in Hagerstown, Md., in 1921-24 and 1955-57, together with a concentration of hospitalization in one local hospital, provided the basis for a comparison of rates and patterns of hospitalization in the early 1920's and the mid-1950's. It was found that over this 35-year period, hospitalization rates in Hagerstown had increased three times in terms of annual days of care and $5\frac{1}{2}$ times in terms of admissions.

No single factor accounted for the increase in hospitalization. There was a small growth in the proportion of persons having more than one admission during a given year. The rate of hospitalization increased in all age groups, although the rate of increase was somewhat higher among children under 5 years and persons 65 years and over. The proportion of older persons in the population approximately doubled between 1921-24 and 1955-57.

There were increases in care for practically every diagnostic group studied. Only a part of the large increase in care among women of childbearing age could be attributed to an increase in hospitalization for the delivery of babies. Other diagnostic groups showing larger than average increases for all ages included circulatory diseases, genitourinary disorders, and neoplasms.

Average length of stay in the hospital decreased well over one-third between the earlier and the later surveys, but this decrease only partly offset the effect of increased admission rates in raising total hospital days. The greatest decrease in length of stay was among persons 25-44 years old. Very little change occurred in the lengths of stay of children under 15 and persons 65 and over.

One factor making for increased hospitalization probably was the increased occurrence of certain chronic illnesses, but for the particular illnesses studied the hospitalization rates tended to increase faster than the illness rates. Analysis of death rates showed that more people were dying of chronic diseases and that an increasing proportion of deaths were occurring in the hospital.

While hospital care increased, the supply of physicians relative to population remained about the same in 1955-57 as in 1921-24. The ratio of hospital beds to population was greater in the later period than in the earlier, but not enough greater to keep pace with the increase in hospital use. Hospital insurance coverage facilitated hospitalization in the later period to the extent that it paid for all or part of the hospital bills of about three-fifths of the patients.

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The National Attack on Rheumatic Fever

AIMS C. MCGUINNESS, M.D.

WHILE we have made a great deal of progress against rheumatic fever, it is still a killer and crippler; it is still a national menace. Cold statistics give us an idea of its extent, but they can never measure the full tragedy, the hurt to the families whose children have been struck down with this disease. It has been estimated that about 2 million people living in the United States today have already had, or will develop, an attack of rheumatic fever at some time during their lives. Of these, more than 500,000 will probably die because of the rheumatic process or some complication developing directly from it. Rheumatic fever most often strikes children between the ages of 5 and 15, and the resulting rheumatic heart disease causes about 50 percent of all heart disease in this age group. I am told that in the 5- to 19-year age group in this country there is a current annual incidence of about 60,000 cases of rheumatic fever. About half of these are recurrences, and half first attacks.

The total economic waste caused by rheumatic fever in the general population cannot be even roughly estimated. But we do know that during World War II, rheumatic fever alone immobilized more than 400,000 men in the armed services, at a cost to the Government of about \$640 million.

We must never lose sight of our ultimate goal: the complete eradication of this killer and crippler. Let us hope that the progress we have made will whip us into even further—and unrelenting—efforts. I think it will.

The concerted national attack on rheumatic fever, in which the Federal Government plays an important role, has shown spectacular growth since it began less than a decade ago. Rheumatic fever and rheumatic heart disease are, of course, a major concern of the National

Heart Institute, Public Health Service, and research support in this area has increased more than tenfold since 1949 to a current total of around \$1.5 million annually. The institute conducts a substantial research program of its own in Bethesda, but devotes most of its funds to the support of cardiovascular research in hospitals, universities, medical schools, and other institutions throughout the country.

The institute's research grant program in rheumatic fever and rheumatic heart disease is helping scientists approach the problem from many different directions. Population studies are bringing in new knowledge of the movement of streptococcal infection among families and individuals. Scientists are also trying to find out more about the nature of immunity from these infections.

One of the most urgent needs in this field is for more fundamental knowledge of the intricate cellular events and mechanisms of connective tissue, the target of rheumatic fever. For this we need more intricate equipment and more highly skilled workers.

Since the most widely accepted theory of the nature of rheumatic fever is that it is an allergic reaction of certain of the connective tissues to some substance given off by the streptococcus—the cause of streptococcal infections—attention is being focused on the biochemical and biophysical mechanisms involved in allergic responses, and attempts are being made to identify the streptococcal substance to

Dr. McGuinness is special assistant for health and medical affairs to the Secretary of Health, Education, and Welfare. The paper is part of the Harry Remer Memorial Lecture delivered by Dr. McGuinness on June 14, 1959, at La Rabida Sanitarium in Chicago, Ill.

which approximately 3 percent of all children between the ages of 5 and 12 seem to be allergic.

Gains in Research

As has often been the case, victory over a disease may be greatly speeded if it can be produced experimentally and studied in animals. For many years, rheumatic fever research has been hampered by inability to produce it in the laboratory. But now scientists believe they have achieved this. Rabbits given repeated injections of streptococci have developed heart defects similar to those of rheumatic heart disease. If further research bears this out, the work should serve as a valuable springboard.

Drug studies are of paramount importance, because we do not as yet have an ideal drug or drug combination for treating rheumatic fever itself. We now know that ACTH and cortisone, at least in the smaller doses used in early studies, are no more effective in treating rheumatic fever than aspirin. We found this out from a very valuable international study conducted in 13 hospitals in the United States, Canada, and Great Britain with the aid of the National Heart Institute. Dr. Albert V. Dorfman and his group at the La Rabida Sanitarium are, I understand, analyzing statistically the first results of a large-scale study they have made of hydrocortisone therapy in rheumatic patients, in which substantially larger doses of drugs have been used.

We now have enough knowledge about the control of rheumatic fever to make possible an adequate and thorough program of preventing it in any community.

Services for Children

Developments in the treatment of children with congenital heart malformations in the last two decades have been truly dramatic. The number of children who were previously doomed to an early and inevitable death has been drastically reduced by the development and use of a wide variety of surgical techniques.

Since 1939, the Children's Bureau through its crippled children's program has been offering children with rheumatic fever medical help

that may limit the impairing effect on their later productive lives. At present, all but one State offer services to children with rheumatic heart disease in the crippled children's programs which have developed as a part of the Federal-State partnership.

More recently, the Bureau, with the cooperation of the States, has developed ingenious patterns to make complicated heart surgery available to the maximum number of children with congenital heart defects who can benefit from such surgery. Not only through the regular crippled children's programs but through five regional heart centers as well, children are now receiving surgery for congenital heart malformations which for many of them can make the difference between life and death. The number who have been served under this part of the crippled children's program increased from 2,000 in 1950 to 10,000 in 1957. In the meantime, a variety of surgical techniques, most recently open-heart surgery, have been developed. As a result the number of congenital heart conditions which are operable has increased. At the request of the administration, Congress recognized this development during the current session by appropriating \$1.5 million above regular funds for the crippled children's programs to be used especially for these lifesaving heart malformation operations.

Prevention and Control

Illustrative of another approach to the prevention of rheumatic fever is the drive conducted jointly several years ago by the National Heart Institute and the American Heart Association. It made an important contribution. Various aids for physicians and other health workers, such as folders giving the latest diagnostic criteria and treatment recommendations, were sent to every physician in the United States.

Another branch of the Public Health Service, the Bureau of State Services, has played an important part in the national attack on rheumatic fever through its Heart Disease Control Branch. This branch assists States and localities, both through financial grants and assignment of people with special technical skills when they are needed, in establishing and im-

proving heart disease control activities. The establishment of rheumatic fever registers and prophylaxis programs and the development of better rheumatic heart disease diagnosis and casefinding methods are of course vitally important.

In Chicago a new study was started in April 1959 to test the practicality of mass screening as a way of finding children who should seek medical attention for possible heart defects, including those caused by rheumatic fever. A special tape-recording device, developed by the Chicago Heart Association, is being used. The study, in which the heartbeats of 40,000 fourth-grade school children will be recorded, will aid health workers in finding out what problems may be involved in large-scale screening programs of this kind and will also provide data on the number of children with undetected heart defects.

Guiding the project with the Public Health Service is an interagency committee composed of representatives from the Chicago Board of Health and Board of Education, the Chicago Medical Society, the American Heart Association, the Children's Memorial Hospital, the parent-teachers association, and several universities. Since the outlook for children with heart abnormalities is much better if their condition is diagnosed and treated early, the adoption of faster and less expensive methods of finding early cases would certainly save many lives.

Recently, exploration of another promising and rather novel possibility—the use of an electronic computer as an aid to the physician diagnosing cardiovascular disease—was begun by the Heart Disease Control Branch. The basic idea is to develop a computer into which all pertinent objective data could be fed, such as data concerning the electrocardiogram, the phonocardiogram, the ballistocardiogram, and the arterial pulse, together with such factors as age, sex, height, weight, and blood pressure. The computer would then indicate to the physician the probability of specific heart diseases or injuries.

These, of course, are only illustrations of the work affecting the rheumatic fever problem that the Heart Disease Control Branch is aiding. The encouragement and help that it has given State and local health departments to establish and enlarge rheumatic fever programs has been one of the major factors in the tremendous growth of this nationwide endeavor.

The number of States assuming a responsibility for either or both prevention and treatment of rheumatic heart disease increased from 12 in 1950 to 40 in 1958. Also, the number of States now engaged in the distribution of free or low-cost prophylactic drugs has increased from 2 in 1950 to 29 in 1958. A number of the remaining States that have not yet developed programs are encouraging rheumatic fever and rheumatic heart disease control efforts both in local health departments and in nonofficial agencies. These facts certainly show a great public awakening to the problem in this decade.

Along with this awakening to the problem in this and other areas of health research has come some concern that today's large Federal grants in the field of medical research are stifling private giving in the field of health. The fact is that nothing could be farther from the truth.

Support for medical research from all sources jumped from \$88 million in 1947 to about \$450 million this year. Of this \$450 million, the Federal Government contributed approximately half, and the balance came from industry, endowment, and private philanthropy.

In June 1958 a group of consultants on medical research and education, headed by Dr. Stanhope Bayne-Jones, made their report after an exhaustive nationwide study. I was particularly interested in this comment in the report: "Americans have always banded together voluntarily to accomplish certain commonly valued objectives. This has been particularly evident in the health field. . . . Humanitarian sentiments and religious doctrines that foster respect for life and for the individual, combined with respect for science, will engender continuing and strong support for medical research from both public and private sources."

Nutritionists aid staff members of an organized home care team in recognizing and interpreting the importance of diet in the care of patients with long-term illness.

The Nutritionist in Organized Home Care

MILDRED KAUFMAN, M.S., and MARIAN S. BRYAN, M.S.

THE NUTRITIONAL NEEDS of the chronically ill too often are considered only when a therapeutic diet is required. Nutrition service is commonly believed adequate if diet instructions have been given in the hospital or if the physician has provided the patient with a diet list.

Thoughtful observers will quickly recognize that this approach ignores the dynamic role of nutrition in the patient's improvement, rehabilitation, or recovery. Even the most clearly written diet instruction sheet is not effective in motivating patients to change or improve the eating habits of a lifetime. The nutritionist in organized home care plans gives other team members stimulation and guidance in developing the knowledge, skills, and techniques to recognize nutritional needs and to assist patients and their families in achieving and maintaining an appropriate diet.

Nutritionists, as an integral part of organized home care programs, have a valuable contribution to make in the treatment of patients with long-term illness.

Organized Home Care

Organized home care programs have developed in a number of communities as an answer to the mounting problem of providing comprehensive care to patients with long-term illness (1). These programs coordinate the various skills of the medical care team and bring them to the patient at home. The trained

workers who provide the skilled services also teach family members to perform some of the simpler procedures needed for care of the patient. Through this plan, the patient receives the professional care and supervision he requires while remaining a part of his family and enjoying the comfort and security of his own home. The family continues to provide such basic essentials as food, shelter, laundry, clothing, and other necessities (2).

As specifically defined, "Organized home care provides coordinated medical and related services to selected patients at home through a formally structured group comprising at least a family physician, a public health nurse, and a social caseworker assisted by clerical service. For satisfactory functioning, patients must be formally referred and there must be an initial evaluation, monthly review of records, and a final discharge conference. There must be ready access to inpatient facilities." This definition was agreed upon at the Roanoke conference on organized home care which was sponsored by the Public Health Service in June 1958.

Organized home care programs now in operation are administered by hospitals or such agencies as visiting nurse associations and local

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health or welfare departments. Administration and services vary with the agency from which the program operates. Regardless of the administration or agency, the services should be planned around the care needs of the patients. The above definition, as well as a review of the existing programs, indicates that the minimum services considered essential are medical, nursing, and social services, and provision of drugs and supplies. Services considered desirable are physical and occupational therapy, homemaking, health education, and nutrition (3).

Nutrition Needs in Long-Term Illness

In considering the needs of patients, optimal nutrition is emphasized as one of the most important environmental factors affecting health. However, nutrition is one area which professional workers might easily overlook if their attention is not directed to it, since the family of the home care patient assumes the responsibility for planning, preparing, and serving his meals.

The kind and quantity of food that will meet his individual needs are essential for each patient. An inadequate diet must be improved to provide an optimal level of nutrients. Special needs require increases above normal nutrient requirements, to help fight infection, or to heal wounds, decubiti, and fractures, or to aid recovery from an anemia. Reducing the obese patient and bringing the underweight up to normal weight often are essential steps in rehabilitation. Correction of constipation through diet can reduce the use of medication and the need for routine enemas. Diabetes, cardiac disease, gastrointestinal disorders, liver or gall bladder disease, or other medical conditions require modified diets, and chewing or swallowing difficulties require changes in the consistency of food.

Whether a therapeutic diet or improvement in the nutritional quality of the diet is ordered, the patient and his family almost inevitably need and desire some guidance in their meal planning. Often there is need for improvement of the nutritional value of the entire family diet.

Because good nutrition can contribute to the

vigor, well-being, and therapy of the patient, dietary guidance should be an essential part of a well-organized home care plan.

Role of the Nutritionist

The role of the nutrition consultant in the Philadelphia Home Care Plan illustrates how nutrition services can be integrated into an organized home care program. Administered by the Visiting Nurse Society of Philadelphia, this program is a special service within the agency (4). For many years the society has employed a full-time nutrition consultant to help the nurses plan for the nutritional needs of their patients and to participate in student and staff inservice education. When the plan was organized in 1949, it was recognized that the nutrition consultant should be a member of the team and that part of her time should be devoted to home care activities.

The team includes the patient's physician, medical consultant to the plan, nurse coordinator, staff nurse, social worker, physical therapist, occupational therapist, occupational health consultant, as well as the nutrition consultant. At team conferences, candidates are evaluated for admission and plans are made for the care, treatment, and rehabilitation of the patient. At this time, the patient's needs and the contributions of various services are coordinated. The patient's progress is reevaluated periodically at subsequent meetings.

The nutrition consultant interprets to the team the dietary goals desirable for the patient. Dietary guidance is thus coordinated with the other home care services, placing nutrition in its proper perspective. With conference planning, followed by consultation, it is possible for team members who work directly with the patient to integrate nutrition advice into patient contacts and so strengthen diet teaching.

A consultant seldom has direct contact with the patient. She is dependent upon others for background and insight concerning the patient and his home situation. The reports of various team members frequently identify factors motivating family behavior, which must be considered in planning for any workable diet regimen. Time is saved and duplication of effort is avoided by early recognition

at the team conference that nutrition is an important aspect of the total plan for care.

Whether or not giving direct service to patients is the most effective use of the nutritionist's time is a decision to be made within the home care program. Factors affecting this decision might be the number, interest, and preparation of other staff workers to do dietary teaching.

To function as a team member, a well-planned orientation for the nutritionist is vital. She should fully understand the philosophy and objectives of the home care program and how to plan for the nutritional needs of patients in their own homes. It is essential that she work closely with the other team members, and to do so, she should feel comfortable as part of the group and appreciate what each of her co-workers is trying to do. In turn, the nutritionist should make sure that all workers understand her function and the importance of good nutrition to the patient. In achieving these goals, the nutritionist should be active in in-service staff education and have assurance of the support of the program administrator.

Case History

The story of a 27-year-old patient shows how this program operates and how the nutritionist contributes. For this discussion, the patient is called *Jane Green*.

Jane was admitted to the Philadelphia Home Care Plan in November 1957, after a year of treatment in a large city hospital. Her illness had been diagnosed as Pott's disease, with paraplegia.

As a basis for the first team conference at admission, the patient's physician submitted a medical referral form which reviewed her physical condition and gave orders for nursing care, physical and occupational therapy, and a 2,500 calorie diet with 125 grams of protein. Jane's public assistance visitor was included in the initial conference.

Workers who had visited Jane for evaluation described her as intelligent and cooperative but discouraged because she was bedfast. She complained of weakness and fatigue to each of them. Jane's mother, with whom she lived, took care of the home and meal preparation.

The team concluded that getting about in a wheelchair would be a minimum goal for Jane, but she might achieve ambulation with braces and a return to some gainful employment. It was felt that the patient's poor nutrition contributed to her chronic state of fatigue, an obstacle in achieving the maximum goal. The patient was quoted as stating that she had "a poor appetite," "ate poorly in the hospital," and "could not eat much at home." The physician had told Jane to "eat more protein." Mrs. Green thought this meant expensive cuts of meat and complained that she was unable to afford the diet ordered.

As a result of the conference, the public assistance worker obtained from the physician a request for an additional financial allowance for the prescribed diet. The nutrition consultant suggested that the nurse ask the patient to keep a food-intake record as a more objective criterion in evaluating Jane's current diet. Questions about food habits and home conditions identified areas for the staff nurse to investigate before dietary guidance could be planned.

Shortly after this conference, the nutritionist and nurse met to discuss Jane's diet. Jane's food-intake record showed that she was eating only two meals a day and small servings of selected foods. She was eating much less than the 2,500 calories and the 125 grams of protein prescribed, and her food intake failed to meet recommended dietary allowances for other nutrients (5).

Since the prescribed diet did not appear immediately practical, as Jane could not eat large quantities of food, a phone call was made to Jane's physician to inform him of dietary findings. He recognized the problem but, because of the nature of Jane's illness, stressed her need for the prescribed protein intake, optimal levels of other nutrients, and calories to provide gradual weight gain of 10 pounds. He urged that an acceptable diet be planned for Jane, working toward the diet prescription gradually, and asked for reports of progress.

Together the nurse and nutrition consultant prepared a diet plan for Jane considering the diet prescription, her appetite and food preferences, and her mother's limited cooking skill. The plan suggested amounts of specific food

groups to provide about 2,000 calories. A supplemental list specified foods which could be added gradually to bring the diet up to prescribed levels as Jane's appetite increased. Jane had agreed to cooperate, stating that she was anxious to do anything that would contribute to her well-being. Written copies of the diet plan were given to the patient, sent to the physician, and kept in the records of the nurse and nutrition consultant. At the request of Mrs. Green, simple recipes were supplied for the foods listed on the diet, particularly some using nonfat dry milk which the family received as a surplus food commodity.

Reevaluation of the patient's food intake at 2 and 4 months following the initial diet instruction showed considerable improvement. Nurse's notes on successive visits showed that Jane was eating three meals a day regularly and was using an increased amount and variety of foods. However, she still needed more foods rich in vitamins A and C. Jane made a real effort, but constant support and encouragement were required to help her continue with the diet. She said that she was enjoying her food more at home. Mrs. Green had tried some of the recipes the nurse had given to her, and she catered more to Jane's taste than would be possible in the hospital. At the end of 4 months, Jane had gained 6 pounds; she was feeling better and was not as weak and tired as she had been.

Diet plans for Jane had been discussed with her physical and occupational therapists, and they were asked to lend encouragement. The physical therapist reported after 4 months that Jane expressed concern about gaining too much weight. She had explained to Jane that as her food intake was increasing her physical activity was also increasing; that her weight gain so far was satisfactory but when she reached the desired weight, the calorie intake would be modified.

Nine months later at the final evaluation conference, it was reported that Jane was walking with braces, getting around the house, and going outside. Employment possibilities outside the home were being explored with the help of the occupational health consultant. Everyone expressed pleasure with the patient's progress and agreed that improved nutrition was a prime

factor in achievement of the treatment goals for this patient.

Use of Nutrition Services

As has been stated, in the Philadelphia program the nutrition consultant attends all of the team planning and evaluation conferences. Individual consultations to give dietary guidance for the patient are held at the request of the nurse or other team member. Requests were made for nutrition consultation on behalf of 95 (49 percent) of the 194 patients admitted from June 1, 1957, to May 31, 1958 (see table).

It will be noted that nutrition consultation was not requested for every patient. Some patients or their families were unable to accept any dietary modification. A few patients died shortly after admission. And in a number of instances, it was felt that an experienced staff nurse had sufficient background to provide suitable dietary guidance without consultation.

With a changing caseload, the demands for nutrition consultation vary from week to week. The nutrition consultant has a flexible schedule and can devote more or less time to home care as needed. She estimates that in an average week she devotes about 6 to 8 hours to individual and team conferences on behalf of patients receiving home care.

Other Patterns

The Philadelphia Home Care Plan has been used to illustrate how a nutritionist in one organized program provides dietary guidance for its patients. It is emphasized, however, that the nutritionist should tailor her service to the individual program and offer to serve in the way that will be most effective for the patients and staff.

Some hospital-based programs utilize the services of their own hospital dietary department. This can be developed in a dietary department which has a well-trained staff with an active patient education program. If the dietitian has initiated diet teaching in the hospital or clinic, she then can follow progress and offer continuing guidance by working with the staff members who visit the patient at home. Since dietary problems of patients at home are

Nutrition consultation in the Philadelphia Home Care Plan, June 1, 1957-May 31, 1958

Diagnostic classification	Patients admitted	Patients for whom nutrition consultation was provided	
		Number	Percent of patients admitted
Cerebral vascular accident--	99	44	44.4
Neurological disorders--	26	11	42.3
Arthritis--	25	16	64.0
Cancer--	7	4	57.1
Fracture--	20	7	35.0
Heart and other circulatory disorders--	5	2	40.0
Diabetes--	8	7	87.5
Tuberculosis--	2	2	100.0
Other--	2	2	100.0
Total--	194	95	49.0

somewhat different from those of hospital patients, the hospital dietitian, working in a home care program and as a member of the home care team, must be oriented by observation and experience to the type of patients cared for by the program and the kinds of homes in which they live. Information concerning diet should be shared with the staff of any of the community agencies who may be providing related services to patients receiving home care.

A number of medical schools have organized home care programs which are used for the training of students. In such programs, a nutritionist can present a dietary teaching program as part of professional education. She can participate actively in team planning and evaluation conferences and, when working directly with patients and their families, demonstrate dietary teaching methods to the students.

In programs that cannot budget a full-time staff nutritionist, it has been possible to "borrow" these services from another health agency.

A nutritionist in a cooperating private agency, in the local or State health department, or on the dietary staff in a cooperating hospital is a possibility. With a limited budget, it also might be possible to employ, on a part-time basis, a qualified nutritionist or dietitian living in the community. When utilizing nutrition service from another agency or on a part-time basis, realistic arrangements must be made to provide continuing service and sufficient time for full participation in conferences.

Conclusion

Nutrition services in an organized home care program may be provided effectively in a number of ways, but the main objective is to help each patient achieve and maintain the diet which best meets his needs, with the least difficulty for him and his family. This objective can be accomplished when the diet teaching plan considers the patient's social, emotional, and financial situation as well as his physical problems; when diet is the concern of all workers attending the patient; and when changing dietary needs are a part of the comprehensive plan for care.

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Progress in Reporting Mental Hospital Statistics

*Ninth Annual Conference of
Mental Hospital Statisticians
Albany, N.Y., May 5-7, 1959*

THE USE of revised terms to define the movement of mental hospital populations, plans for an interstate cohort study of mental hospital admissions, statistical activities of community mental health programs, and new techniques of reporting mental hospital expenditure data were emphasized at the Ninth Annual Conference of Mental Hospital Statisticians.

The conference, held in Albany, N.Y., May 5-7, 1959, is sponsored annually by the National Institute of Mental Health, Public Health Service.

Delegates from each of the 21 member States of the Model Reporting Area for Mental Hospital Statistics attended (see box insert). Observers from Delaware, Iowa, Massachusetts, North Carolina, and Tennessee were also present, as well as representatives from the Dominion of Canada, the Veterans Administration, and the American Psychiatric Association.

Use of Revised Definitions

New terms describing the movement of mental hospital populations were defined and adopted at the Eighth Annual Conference of the Model Reporting Area in Sacramento, Calif., in May 1958. Subsequently, the director of the mental hospital program in each of the Model Reporting Area States approved these definitions and indicated that the statistical system would be able to incorporate them into its reporting procedures at the beginning of the fiscal year 1960.

The revised definitions differ from those previously used in two major respects: (a) the

concepts of first admission and readmission have been replaced by substituting a classification of admissions according to type of hospital in which the patients had previous inpatient experience for mental disorders, and (b) the definition of a State system has been expanded to include public institutions for the mentally deficient, for purposes of distinguishing between discharges and transfers.

A set of schedules, based on the revised definitions, was proposed for the annual reporting of data to the National Institute of Mental Health by States in the Model Reporting Area as follows:

1. Movement of population by sex.
2. Movement of population by age, sex, and mental disorder.
3. Movement of population by time on books (time in hospital plus time on leave), sex, and mental disorder.
4. Admissions with no record of prior admission in any inpatient psychiatric facility, by age, sex, and mental disorder.
5. Admissions with prior admission to hospitals in the same State system only, by age, sex, and mental disorder.
6. All other admissions by age, sex, and mental disorder.
7. Resident patients at end of year by age, sex, and mental disorder.
8. Personnel employed at end of year.
9. Financial statement.

The suggested schedule for movement of population by sex is considerably more detailed than the one in use. While the current form balances the book population of the hospital

only, the new form covers both items affecting the resident population and those affecting the population on leave. The admission section of this schedule is divided into the following categories:

1. Admissions with no record of prior admission to an inpatient psychiatric facility.
2. Admissions with prior admission to hospitals in the same State system only.
3. Admissions with prior admission to other inpatient psychiatric facilities only.
4. Admissions with prior admission to facilities in both the same State system and other inpatient psychiatric facilities.

Discharges on this schedule are classified as:

1. No further treatment indicated.
2. Against medical advice.
3. Treatment in another facility intended.

It was agreed that this classification would be optional since discharges cannot be so classified in some State systems.

Data on the movement of population by age, sex, and mental disorder and by time on books, sex, and mental disorder have been prepared in only one State. Such data are basic to an understanding of the dynamics of a hospital population. They permit the computation of annual net release and death rates specific for age and for length of time on the hospital rolls.

Rates have been computed according to these variables for a single hospital and have revealed pronounced variations by age, diagnosis, and length of time on books. Studies of trends in these specific indexes can pinpoint the various elements of the hospital populations in which significant changes in the movement of patients are occurring. These studies can also assist in evaluating new therapies and treatment programs as well as changes in administrative policies.

Nationally, consolidation of mental hospital data will pose some problems in that 21 States will be reporting by one set of definitions and the remaining States by another. However, the first year's experience gained by the Model Reporting Area States will be of great assistance to the States not in the area as they convert to the new definitions. It is expected that within 2 years most of the States will be reporting nationally by preparing the same set of tabulations.

Cohort Studies

The report of the first cooperative interstate cohort study entitled, "Patterns of Retention, Release, and Death of First Admissions to State Mental Hospitals in 1954," soon to be published as a monograph, stimulated interest in additional interstate cohort studies. A cohort study committee, appointed at the eighth annual conference, presented its report at the ninth annual conference. The committee indicated that a further cohort study would allow control of certain factors which were not controlled in the first study, hopefully permitting the discovery of further factors responsible for interstate differences in probabilities of release, retention, and death. Analysis of cohorts of admissions for several States should provide a more meaningful picture of the course of hospitalization for mental illness than a study done in a single State.

Discussion of specific questions a new cohort study could answer revealed a major interest in the following:

1. What proportion of a study cohort is in the hospital, has died, or is out of the hospital at certain anniversary dates after admission?
2. What is the probability of first significant release from the hospital within specified intervals of time after admission?
3. What is the probability of return to the hospital within specified intervals of time after release among a cohort of patients who have had a first significant release?

Relationships between these probabilities and such factors as age, sex, diagnosis, marital status, race, legal status, and place of residence could be investigated. Interstate differences in

Model Reporting Area States

Representatives from the following States are members of the Model Reporting Area for Mental Hospital Statistics:

Arkansas	Louisiana	Oklahoma
California	Michigan	Pennsylvania
Connecticut	Minnesota	South Carolina
Illinois	Nebraska	Texas
Indiana	New Jersey	Virginia
Kansas	New York	Washington
Kentucky	Ohio	Wisconsin

the results would answer certain questions about State mental hospital programs and might raise other questions which should be investigated by definitive studies.

A discussion revealed that a variety of cohort studies are in progress in the various Model Reporting Area States. However, the questions under investigation in these studies, the variables being controlled, and the endpoints being used varied considerably. It was agreed, therefore, that a retrospective study would not be feasible.

It was proposed that a prospective study be conducted beginning with patients admitted July 1, 1959. The prospective study would consider three major questions, the determination of the status of each patient on specified anniversary dates after admission, the probability of significant release or death within specified periods of time after admission, and the probability of return to the hospital within specified periods of time after significant release among cohorts of released patients. Status on anniversary dates would be classified as in hospital, died in hospital, or absent from hospital. To answer the second question requires the determination of intervals of time between date of admission and date of death in the hospital or first significant release. To answer the third question requires the computation of intervals between date of first significant release and date of first return to the hospital. It was agreed that second significant release and second return to the hospital would also be considered. A significant release is defined as one from which the patient is not expected to return and includes direct discharges, trial visits, and escapes of over 30 days' duration.

Each State participating in the study would be required to use a standard punchcard layout and a standard code. Analysis of the data would then be made at a central point, using electronic computing equipment. Specific definitions and rules regarding the mechanics of the study were discussed and approved by the conference members.

Community Mental Health Programs

A panel discussion on community mental health programs was conducted by representa-

tives from four States operating such programs. These States are New York, New Jersey, Minnesota, and California. As described, the programs appear to be quite similar. In each of the four States, the programs are a local responsibility and under local control. In order to qualify for State funds, however, the programs must meet certain standards. Once it has been determined that these standards have been met, the State matches local expenditures up to 100 percent. However, each State law, with the exception of California, defines the amount which the State will spend annually per capita population.

Services for which community mental health funds are available include outpatient psychiatric clinics, inpatient psychiatric facilities of general hospitals, psychiatric rehabilitation services, such as workshops and aftercare clinics, and consultant and educational services to schools, courts, health and welfare agencies, and the like. The type and extent of these facilities vary from State to State.

There was general agreement that community mental health programs have done much to stimulate local interest in mental health. However, relatively few data have been collected on various aspects of these programs in an attempt to evaluate them. Each of these States is collecting some information on outpatient clinics, but only one is obtaining any data on the inpatient and rehabilitation aspects of its program. It was pointed out in the discussion that determination of the effect of community mental health programs requires systematic data collection and analysis as early as possible. If such data collection systems are not begun soon, it will be extremely difficult to measure the impact of these various efforts on the total community mental health program.

Mental Hospital Expenditures

Over the past several years much interest has been expressed in the development of more adequate data on mental hospital expenditures. The consensus has been that the expenditure data collected and published by the National Institute of Mental Health have not been comparable from State to State. The eighth an-

nual meeting of the Model Reporting Area recommended that the NIMH Biometrics Branch call together a committee of statisticians and administrative-fiscal people from several State mental hospital systems to discuss ways of obtaining better interstate comparison of expenditure data. Such a committee met in February 1959, and a report of the meeting was given at the conference.

To date, interstate comparisons of expenditures for the care of mental hospital patients have been based almost solely on expenditures for maintenance per patient per day. Problems are inherent in both the numerator and the denominator of such a ratio. Differences among States in accounting procedures and lack of uniform definitions of items to be included in the total maintenance expenditures have resulted in noncomparable total expenditure figures. Furthermore, the use of the average daily resident patient population as a denominator introduces an element of non-comparability into the ratios because of wide variations among State systems in the composition of the resident patient populations. It was agreed, therefore, that this type of ratio could not be used to answer questions relating to the cost of care of specific segments of the hospital population.

The committee further agreed that a classification of the total amount spent per year by a State mental hospital system for the mentally ill according to each of two axes, object and function, would provide much more meaningful information than currently available. The following items were included in the classification by object: personal services (salary and wages), food, utilities, medical and hospital supplies, clothing, household supplies, communications, travel and subsistence, new equipment, repairs and replacement of equipment, repairs to plant, farm supplies, office supplies, miscellaneous supplies, and patient services in the community. The function classification included inpatient care, outpatient care (including followup services), research, training, and central office.

The group agreed that a cross tabulation of these two classifications for each State would provide more useful data than are now available. However, it was recognized that each of

these categories requires careful definition. Since this would require a considerable amount of research, it was agreed that the task could not be accomplished by the committee. It was suggested that an application for a grant be prepared by a committee of business managers, accountants, statisticians, and medical administrators to finance a study in which these definitions could be developed. This would involve studying the accounting systems in several State mental hospital systems, testing the definitions finally developed, and obtaining the approval of the commissioners of mental health. Subsequent to the committee meeting, the possibility of sponsorship for such a project has been investigated, and it appears likely that a study design will be formulated within the next year.

Hospital administrators frequently have been asked to indicate the cost of care of specific groups of patients, such as children or those 65 years of age and over. The committee indicated that accounting systems are not currently set up to answer such questions. It was recommended that a project be developed in a few State systems in which the cost of caring for patients 65 years of age and over might be determined on a sampling basis. Such a study might be useful to other State systems in making inferences about their own costs for such patients.

Consideration was given to fiscal data which the National Institute of Mental Health should publish routinely. It was recommended that it might be feasible for NIMH to publish not only expenditures per patient per day but also expenditures per patient under care during the year. Turnover in the hospital population during the year would be taken into account in the latter and, when used in conjunction with the former, would provide more meaningful information than is currently available.

Other Problems

The perennial problem of the need for a more adequate classification of mental hospital personnel was discussed. It was agreed that this problem cannot be solved by statisticians alone and the assistance of personnel officers should be enlisted. The NIMH Biometrics Branch

agreed to organize a committee of personnel officers and statisticians which will meet prior to the next conference to discuss the problem and propose solutions.

Several administrators of mental hospital programs have expressed interest in evaluating the effectiveness of their programs. This stems from an increasing demand by State legislatures for information on the results achieved through expenditures for hospital construction and maintenance and for the care of patients. Thus far, only crude data on movement of hospital populations and on the experience of cohorts of first admissions have been available. While these data have provided partial answers to the questions raised by the administrators, many other important questions have remained unanswered. A description of a project underway to design a tool for measurement of mental hospital effectiveness served as a focal point for discussion of this problem. Several of the participants indicated interest in testing such a tool in their own hospital systems once it has been developed.

Regional Meetings

A report covered the Fourth Midwest Conference on Mental Health Statistics held in Indianapolis, Ind., on October 1 and 2, 1958.

The most important aspect of this meeting was a discussion of research projects which the group may undertake on a cooperative interstate basis. Of major interest were factors affecting the admission of aged patients to State mental hospitals. A committee was appointed to design a research plan for such a study and this committee reported briefly on its progress at the conference. Research into the following problem areas was proposed:

1. Socioeconomic and demographic characteristics of the patients.
2. Reasons for admission to the State mental hospital.
3. Assessment of the type of care required by the patient at time of admission.
4. Assessment of the care provided during the course of the patient's hospital stay.
5. Background factors affecting admission.

Further committee work will be required before the design is completed.

Plans are being formulated by the 16 States in the area served by the Southern Regional Education Board to hold a meeting of statisticians in the mental hospital field. Seven of these States are now members of the Model Reporting Area, and it is the aim of this group to assist the remaining nine States in qualifying for membership.

Health Hazards in Drycleaning Plants

A study of drycleaning establishments to determine the extent of employees' exposure to solvents during cleaning operations has been conducted by the California Department of Public Health at the request of the State Board of Dry Cleaners.

State laws regulating drycleaning operations have been successful in promoting a safe working environment, but in some plants, as a result of poor operating procedure and gross negligence in maintenance, a high exposure to perchloroethylene solvent vapor has been observed during the study.

Plant operators favor the recommended use of an inexpensive halide-leak detector and testing for solvent leaks at frequent intervals.

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, July 14, 1959*

Control of Radioactive Wastes

I AM HAPPY to report that the first Federal enforcement action to control contamination of interstate waterways by radioactive wastes has now reached a successful conclusion through voluntary agreement.

As a result, the Vanadium Corporation of America will take immediate steps to prevent radium from its uranium milling operations in Durango, Colo., from being discharged into the Animas River, which flows from Colorado into New Mexico.

Agreement was reached at the second session of a conference held under the auspices of the Public Health Service in Santa Fe, N. Mex., on June 24, 1959. The Surgeon General of the Public Health Service approved the agreement July 14, 1959, and will notify the water pollution control authorities of Colorado and New Mexico, who are responsible for enforcing it. The agreement provides that the Vanadium Corporation within 4 months will be employing measures to reduce the radium in its waste discharge to the minimum it is possible to achieve by known methods.

This first enforcement action involving radioactive pollutants in water is significant for several reasons:

1. It sets a precedent for maintaining high standards in the control of radioactive wastes and human radiation exposure.

Although by merely extracting solid particles of radium from the wastes discharged into the river, radioactivity would have been materially reduced, the agreement goes beyond this and includes removal of all radium that can be removed by known methods.

2. The value of the 1956 law authorizing the Public Health Service to undertake pollution

surveys of all interstate streams and to institute antipollution procedures has been dramatically demonstrated.

Approximately 30,000 persons in southwestern Colorado and northwestern New Mexico were using Animas River water, which ranged from 40 percent to 160 percent above maximum permissible levels of radioactive content. This fact was established by an intensive survey of the river, begun by the Public Health Service in April 1958 and completed in April 1959.

Because the law permits the Public Health Service to conduct water pollution surveys and hold conferences on the abatement of interstate pollution, the situation was brought under control before the population of the area had ingested sufficient amounts of this radioactive material to cause detectable health damage.

The pollution abatement procedure under the 1956 law is this: A conference is called by the Surgeon General. If agreement is not reached at the conference, or if the agreement concluded is not fulfilled, a public hearing is called by the Secretary of Health, Education, and Welfare. If the hearing board so recommends, the Secretary of Health, Education, and Welfare is empowered to issue a cease and desist notice which could lead to court action by the Attorney General of the United States.

During 1960, the Public Health Service expects to begin studies of the radioactive content of three rivers in Wyoming: Bighorn, Sweetwater, and North Platte.

3. The disclosure of a hitherto unsuspected hazard of chemical pollution was an important byproduct of the Animas River survey.

When the Public Health Service assigned an aquatic biologist to analyze the amount of radioactivity being absorbed by fish in the river—a standard procedure in such surveys—the biologist found that the river contained few fish and very little other aquatic life. Subsequent study revealed that a number of toxic

chemicals which were also contained in waste discharged by the Vanadium Corporation had caused this destruction.

Consequently, the company, in addition to controlling the radium in its wastes, will also recover the toxic chemicals before they reach the river.

Fluoride Naturally Present in Water Supplies

Fluoride occurs naturally in water used by communities in 43 States, according to a Public Health Service report "Natural Fluoride Content of Communal Water Supplies."

Based on data compiled by the dental directors of all State health agencies, the report indicates that the water supplies of 1,903 cities and towns with a combined population of 7 million contain enough fluoride naturally to prevent 2 out of 3 dental cavities.

In Texas, 2,700,000 persons in 356 towns use naturally fluoridated water. In New Mexico, 465,000 people, or 68 percent of the total population, live in communities with such water supplies.

More than 450,000 people in 136 Illinois towns and 406,000 in 184 Iowa communities drink water with fluoride present in nature. At least 100,000 people in each of 10 States, California, Colorado, Florida, Idaho, Indiana, Kansas, Louisiana, Michigan, Ohio, and Wisconsin, live in towns served by naturally fluoridated water supplies.

Thirty-five percent of the 7 million persons using naturally fluoridated water live in towns and cities with populations of more than 50,000. Thirty-eight percent live in towns of from 5,000 to 50,000 and 27 percent in communities of under 1,000.

The fluoride found naturally in water is identical in its effect to the fluoride used in controlled fluoridation, according to Dr. John W. Knutson, chief dental officer of the Public Health Service. The 1,800 cities now using controlled fluoridation adjust the fluoride content to that found in a great many of the naturally fluoridated water supplies throughout the country, or from 0.7 to 1.2 parts of fluoride per million parts of water. The 35 million people living in these 1,800 communities plus the 7 million using naturally fluoridated water means that 1 out of every 3 people using central water supplies now drinks water that has been fluoridated by nature or by the community.

A Record and Reporting System for Field Research Units

BENJAMIN E. CARROLL, M.A., and SAMUEL C. INGRAHAM II, M.D., M.P.H.

A UNIFORM system of records, files, and reporting has been devised to facilitate collection by several field research units of data suitable for consolidation. Its use permits efficient daily operation with the flexibility necessary to serve individual goals of each unit, yet makes practical the reporting of comparable data to a central office for reduction and processing.

The research, under the sponsorship of the Field Investigations and Demonstrations Branch of the National Cancer Institute, Public Health Service, deals with the cytology and epidemiology of human uterine cancer. Each of 10 field units aimed to examine initially around 50,000 to 75,000 or more women, recalling as many as possible for second and third examinations at yearly intervals. The total number examined by all the units is estimated to be of sufficient magnitude to provide statistically valid casefinding, prevalence, and incidence rates for invasive cancer and carcinoma in situ by age group.

In 3 years' operation the record and reporting system has proved effective and workable. A similar plan should be generally usable in medical and public health activities collecting uniform data from geographically separated field stations.

The field research projects obtain cytological specimens, identifying data, and selected medical history information from women recruited

from various segments of the population. The specimens are examined in the unit's cytology laboratory. The cytodiagnosis is entered on an individual patient record form for statistical analysis and is also reported to the examinee or her personal physician. Any necessary additional cytological, histodiagnostic, or clinical studies are performed by or at the request of the personal physician, and results of these are also entered on the examinee's record. Since the several units use similar cytological methods, the data can be collated and totaled.

Record Forms

Three principal records were designed for the study: a basic medical record card, an alphabetical index, and a recall card. The basic record card has undergone one redesign and revision to take care of practical problems encountered in operation.

The patient medical record is an 8-inch by 10-inch card with fairly generous space for each entry (fig. 1). Its format is intended to facilitate reduction of the data to punchcards. To simplify coding, most of the history items are multiple-choice questions that can be answered by a checkmark or a single word or number. Very little writing need be done to record the complete personal and medical history called for. Results of cytology slide readings and tissue diagnoses are described verbally in designated spaces, but they are also recorded by code numbers. Use of the diagnostic codes simplifies uniform reduction of data for all projects and obviates the interpretation of handwriting and medical terms by coding clerks. Space is provided for results of repeat tests as necessary.

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Figure 1. Patient record card

1 CASE NO.		2A. DATE (Day)		2B. DATES OF PREVIOUS SCREENINGS (First) (Middle)		4. PHONE		5 TYPE BALAR	
2. NAME MRS. MISS		6 ADDRESS (Number and Street) (City) (State)				7 RESIDENCE COLOR		10. NOW PREGNANT <input type="checkbox"/> NO <input type="checkbox"/> YES	
8 RACE <input type="checkbox"/> WHITE <input type="checkbox"/> NEGRO		9 AGE		10 RELIGION <input type="checkbox"/> PROT. <input type="checkbox"/> CATH. <input type="checkbox"/> JEW.		11. MARITAL STATUS <input type="checkbox"/> MARRIED <input type="checkbox"/> WIDOW <input type="checkbox"/> SINGLE <input type="checkbox"/> SEP OR DIV.		12. AGE AT FIRST MARRIAGE	
16. NUMBER OF PREGNANCIES TOTAL STILL B. MUSCARR. LIVE BIRTHS ABORTIONS		17 AGE AT MENARCHE		18 DATE OF LAST MENSTRUATION MO ____ YR ____		19 MENSTRUAL REGULARITY <input type="checkbox"/> REG <input type="checkbox"/> IREG		20 YEARS SINCE MENOPAUSE BEGAN	
22 ABNORMAL VAGINAL BLEEDING, BLOODY DISCHARGE OR SPOTTING WITHIN PAST YEAR, DURATION ____ <input type="checkbox"/> NONE PRIOR TO PAST YEAR, DURATION ____		23 PREVIOUS UTERINE OR PELVIC TREATMENT <input type="checkbox"/> NONE <input type="checkbox"/> HORMONES <input type="checkbox"/> RADIATION <input type="checkbox"/> SURGERY		24 PRIVATE PHYSICIAN		25. PHYSICIAN'S ADDRESS		26. LAST PELVIC EXAMINATION DATE BY WHOM	
27 SOURCE <input type="checkbox"/> PRIVATE PHYSICIAN <input type="checkbox"/> INDUSTRY <input type="checkbox"/> CYTOLOGY UNIT CLINIC <input type="checkbox"/> INSTITUTION <input type="checkbox"/> OTHER		28 CLINIC		29 WARD					
REMARKS									
LABORATORY RESULTS									
TYPE	NUMBER	SOURCE	READING	DATE	REPORT TO <input type="checkbox"/> DR. <input type="checkbox"/> PAT	DATE SENT	RECOM.	SCREENING NOTES	
1					<input type="checkbox"/> DR. <input type="checkbox"/> PAT				
2					<input type="checkbox"/> DR. <input type="checkbox"/> PAT				
3					<input type="checkbox"/> DR. <input type="checkbox"/> PAT				
4					<input type="checkbox"/> DR. <input type="checkbox"/> PAT				
5					<input type="checkbox"/> DR. <input type="checkbox"/> PAT				
TYPE SPEC.		DATE	DIAGNOSIS						
LAB		NO	CODE						
TYPE SPEC.		DATE	DIAGNOSIS						
LAB		NO	CODE						
INDUSTRIAL OR INSTITUTIONAL PHYSICIAN			PATIENT'S OCCUPATION			FIRM BY WHOM EMPLOYED			
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE PUBLIC HEALTH SERVICE U. S. GOVERNMENT PRINTING OFFICE : 1957 O P-422421 PH-1819-B (Rev. 4-57) VAGINAL CYTOLOGY EXAMINATION									

The classification of cytology results and final diagnoses based on tissue studies or other procedures was agreed upon by all project directors. To accommodate minor variations in the scheme, two-digit codes were devised. All directors agreed, however, to observe the dividing lines between the five major categories of results as uniformly as possible.

Both sides of the card are identical so that two series of tests may be recorded. Some projects, however, find it more practical to use a fresh card for each series. When used in the immediate environs of a project, this record is printed on a fairly heavy index stock, but when it must be folded or rolled for mailing, it is printed on a lighter stock.

The patient record is initiated by the physician, nurse, or technician who collects the speci-

men and enters and checks the identification and medical history items. Detailed instructions for completing the card were issued to the staff of all projects. The field unit's central office assigns case numbers for identification and as an automatic count of the number of women examined. An examinee retains the same case number throughout her participation in the project, and each number is used only once. If a number is vacated because of duplication, it is reassigned to a new patient. The field unit keeps a register of its case numbers, showing the numbers in serial order and the names of the examinees.

Patient record cards are filed by case number. This system has the major advantage of expandability by addition at the end. In an alphabetical file, when expansion becomes necessary,

nearly all cards in the file must be shifted. Also, numbers can be sorted and filed much more quickly and accurately than names.

For filing these 8-inch by 10-inch cards, cases are available with shallower drawers than are used in regular letter files. Thus, a case of standard height accommodates five drawers instead of four, which greatly reduces the space required for filing cabinets.

In order to attain the individual project goals, repeat examinations are necessary at stated intervals, usually yearly, on as many examinees as possible. A recall file has been set up to assist in this function. It operates as a tickler file to indicate which examinees are to be recalled each month. The recall card, 3 by 5 inches in size, contains name and case number of patient, home address and telephone, business address (if any), husband's name, and name and address of a friend or relative who presumably will always be in touch with her, plus screening and recall dates (fig. 2). Experience has shown that contact and recall is facilitated greatly by the supplementary information on this card. Quantitative evaluation of the usefulness of the various items in contacting examinees has not been attempted, but each item has been useful in locating some examinees.

Recall cards are filed according to month of

examination. A set of index guides for the months of the year is required, along with 12 sets of alphabetical guides, so that names may be alphabetized within each month. All cards filed under a given month are then ready to be lifted out and used for recall 1 year later. If a smear or other specimen is received for a patient before her recall date, her recall card is moved to the current month so that she will not be recalled until a year after the most recent examination.

The recall file is intended only for annual or other routine recalls. The medical record cards for examinees requiring repeat of unsatisfactory or suspicious tests or tissue studies are kept in a temporary file which can be accommodated easily without special provisions. The cards in this file for examinees who do not respond within a reasonable time (60 to 90 days) and who cannot be located by the followup staff are removed and placed in the main record files as incomplete cases. This procedure avoids obstructing the very active temporary file with cards that may never be reactivated.

Since the patient record cards are filed numerically, an alphabetical index is kept to enable the staff to find records by name of the examinee. The alphabetical index is made up on panels mounted on a rotary stand (fig. 3).

Figure 2. Recall card

MRS./MISS		NO.	
ADDRESS—HOME		PHONE	
REMARKS.			
ADDRESS—BUSINESS		PHONE	
HUSBAND'S NAME		MAIDEN NAME	
RELATIVE OR FRIEND			
ADDRESS			
SOURCE PHYS.-HOSP.-ETC.			
DATES SCREENED			
DATES RECALLED			
PHS-1819-11			
3-56			
RECALL RECORD			

Each panel accommodates a large number of narrow strips of composition board on which are typed names, addresses, case numbers, and any other identifying information desired.

As the cytological specimen and the medical record card are received at the project records office and before a case number is assigned, each name is checked against the alphabetical index to determine whether or not the individual is a new participant. If an examinee has been seen previously, the existing card is pulled from the file and the new results added. The record cards for new patients are alphabetized and index strips are typed from the cards so that the strips are automatically in proper order for adding to the panels.

The alphabetical index may be started with a small capacity and later expanded. However, starting with the full expected capacity reduces the need for shifting panels and strips as the index expands. In our system, all project directors elected to start with the full capacity. Subdivisions separating an alphabetical file of names into any given number of approximately equal groups are available from filing equipment manufacturers. These are important, since the filling of panels at unequal rates will necessitate the shifting of large numbers of strips from panel to panel to make room. Alphabetical guides for labeling the panels may be purchased or prepared to correspond to such subdivisions.

In addition to these basic records, each project has established one or more subsidiary files for special purposes. These files usually consist of duplicates or abstracts of a portion of the main medical record file to keep closer track of "all positive cases" or "all suspicious cases," for example.

Reporting System

Several methods of reporting the data to the central office were considered. Accuracy and simplicity were of course basic requirements, but also it was considered essential to obtain copies of records with minimum disturbance of recordkeeping routines at the field units. Although a number of methods might have met these objectives, it was decided to transmit copies of the records by microfilm. Microfilm-

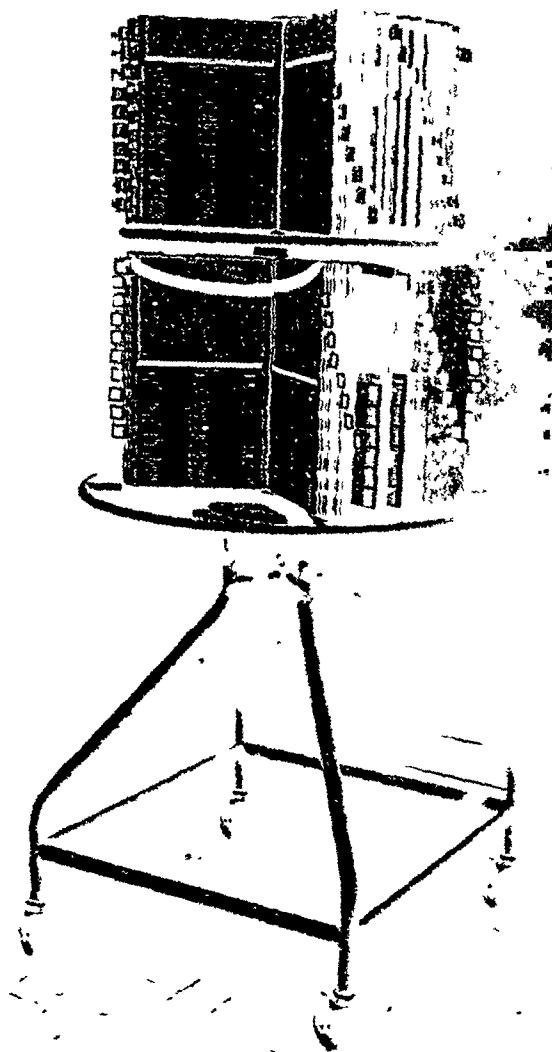


Figure 3. Alphabetical index

ing is a simple procedure, and it provides a batch of records that is a compact and inseparable unit rather than 1,800 separate prints.

A microfilmer for photographing records on 16-mm. film (at a reduction of 19 to 1) was placed in use in each project. The equipment is rented, and instruction and service as well as installation are included in the rental charge. Thus the personnel of the field unit have a minimum of responsibility for taking care of the machines.

A procedure was set up for filming each record as soon as it is completed and before it is permanently filed. After a record is filmed, the last entry is checkmarked. This notation

enables the central office coding clerks to tell which results are new if the same record is refilmed later to show more information. When an additional examination is entered on the same form, the record is refilmed to show the new information and the last line of results is again checkmarked. When an annual reexamination is made, the entire case record is filmed, in reverse chronological order, so that the coding clerks can evaluate the patient's entire record.

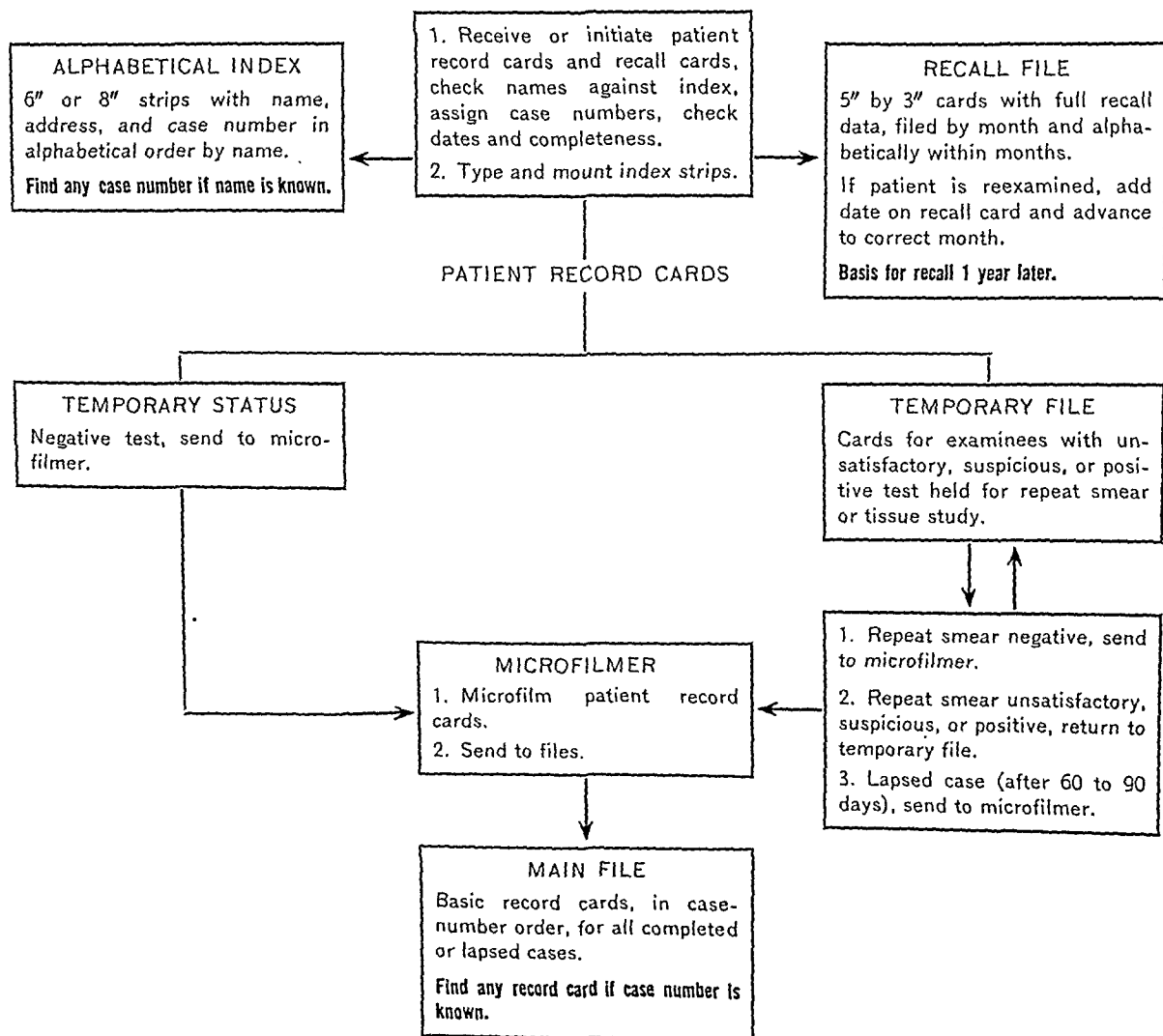
Since there is occasionally a faulty film, the field unit keeps a record of case numbers included on each reel or flags the group of cards

in the file until informed by the central office that the film has been received and is satisfactory.

The microfilm reels are mailed in preaddressed envelopes to the vendor in Washington, D.C., where they are developed and forwarded to the central office of the study. When a reel is received, the central office routinely mails a fresh reel of film to the field unit.

The microfilm method of transmitting records is highly satisfactory. It provides the central office with a current account of the number of examinees and the correctness of record-keeping. It makes possible the current or nearly

Flow Chart for Cytology Project Records



current reduction of all data to punchcards. It encourages accurate and legible records, since everyone concerned knows that the records must be capable of photographic reproduction. The method is economical for large numbers of records, and no copying errors can occur. Project files are not disturbed, since record cards are microfilmed before they are filed.

Central Office Operations

Centralization of coding operations has proved its worth. It permits control by the central office of the code used, the interpretation of coding rules, special decisions, and the like. The central office, having in mind the objectives of the entire study, can apply the same rules and procedures to all data.

For economy and speed, coding is done and cards are punched directly from the microfilm images. This procedure is used by the National Office of Vital Statistics, Public Health Service, for the large volume of documents it receives on microfilm. It has proved practical and economical, since the touching of a key is quicker and less laborious than writing a code digit. The coding clerk, after a few weeks' training, becomes thoroughly familiar with the code and quite adept at the job, coding and punching from 75 to 100 cards per hour. During the training period and early experience of a coder, all cards are verified by an experienced operator. Thereafter, only non-negative cases and 10 percent of the negatives are verified.

All non-negative cases are verified because, since they are a small percentage of all cases, any errors would have a great effect on results. A few errors in the negative cases, on the other hand, could have only a minor effect on the analysis. Furthermore, essential items on negative cards can be checked in batches by needle or sight, since certain punches must be the same in all cards.

Direct coding and punching has proved particularly useful in handling the unexpectedly large volume of repeat examinations. Copying or the use of carbon paper would have meant a tremendous amount of additional clerical work, with greater opportunity for errors and misunderstandings. With the system in use, a re-

peat examination calls merely for an additional filming of the card or cards, and an up-to-date punchcard can be produced quickly from the film. Duplicate cards are detected by mechanical matching of case numbers, and the up-to-date card is selected to be retained in the file.

The punchcards contain 45 columns of data which are uniform for all field units. Those units using different types of specimens and those collecting special data are assigned additional columns. Six columns are used for check or control punches beyond the actual data recorded. Four types of cytological smear are used by the 10 units, but the results of a given type of specimen are always punched in the same columns. For rapid routine tabulations, the cytology results are summarized in one column. The code for repeat examinations is shorter than for original examinations, since most of the medical history is already on record and need not be repunched. Items of data for successive examinations are always punched in the same columns to achieve uniformity in sorting and tabulating and in summarizing the cards for an examinee.

Summary

A system of uniform records and files is now in operation in a large research study of human uterine cancer. Designed for collection by a number of separated field stations of data that can be consolidated, it should be adaptable to the needs of other medical or public health projects with similar objectives.

The record system is coordinated with transmittal of data by microfilm to a central office. There the data are coded from the microfilm images and punched directly into cards. Centralization of coding has the advantage of uniformity, and prompt transmittal and punching of data give the further advantages of providing information on status of work and quality of records, making immediately available simple tabulations for administrative purposes and facilitating currency of punchcard data for preliminary or final analysis.

Copies of the instructions for filling out the basic record card, numbering of cases, and microfilming the basic record may be obtained from Mr. Carroll.

Epidemiology of DOG BITES

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DUANE BROBST, D.V.M., M.P.H., and JAMES F. MOCK, V.M.D.

Human and Environmental Factors

A RECENT survey of animal bites in selected areas of the United States showed a "reported" animal bite rate of 362 per 100,000 human population per year (1). In the same study it was estimated that about 611,500 persons were bitten by animals in the United States

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during 1957. Domestic animal losses cost about \$1 million per year, and medical and public health expenses cost about \$5 million per year (2). Dogs bite people more often than do any other domestic animals in this country, and they are the most common source of human rabies (3). Although dog bites occur frequently, produce human injury, pain, and anxiety, and are costly, as yet there has been no detailed epidemiological study of this problem. Epidemiology has demonstrated its value in acquiring the necessary facts to control infectious diseases and recently has been used successfully to study noninfectious and chronic diseases (4,5) as well as other kinds of animal bites (6). In this study we have tried to elicit the various human, dog, and environmental

factors associated with dog bites, and to determine if these factors indicate ways to prevent and control dog bites.

Materials and Methods

All dog bites reported during July and August 1958, in Pittsburgh, Pa., were studied in detail. This period was selected because dog bites are most prevalent during these summer months. Special dog bite report forms were mailed to the hospitals within the city limits and to physicians (general practitioners, internists, surgeons, and pediatricians) who might be expected to treat dog bite cases in their offices. Practicing veterinarians, personnel working in animal hospitals, members of the Animal Rescue League, and the police were also asked to report dog bites.

The report forms contained detailed questions about each dog bite accident. The information on the victim included name, address, age, sex, race, occupation, if he had been bitten during the past 5 years, and if he knew that the dog had bitten other people. Other data included the kind of animal inflicting the bite (hospitals were asked to report all animal bites), the hour (a.m. or p.m.), date, geographic place, anatomic location, and circumstances under which the bite took place, length and depth of the wound, number of sutures that would have been required if the wound had resulted from ordinary trauma, a checklist of items used in treatment, and the name and address of the animal's owner.

When the dog inflicting the bite was traced, its owner was asked to supply additional information to identify the factors associating the animal with the dog bite accident. These factors are described on pages 898-903.

Incidence

During the 2-month period, 947 dog bites were reported in Pittsburgh, 507 during July and 440 during August 1958, a bimonthly incidence of 14 dog bites per 10,000 human population. The annual incidence of dog bites in Pittsburgh is of about the same magnitude as that reported for other cities of comparable size in this country (1). It was felt that most of the treated dog bites in the city were reported: in 1957 only 230 bites were reported to have

occurred during July and 204 during August. Apparently the reporting system was more effective during July and August 1958 than during the same period in 1957. This improvement can be attributed to private physicians reporting dog bite victims whom they treated in their offices. Of course, some dog bite victims do not seek medical treatment. This seems particularly true if a dog bites his owner!

Characteristics of Victims

Sex. The bimonthly incidence of dog bites per 10,000 population was 19.46 for males and 8.84 for females. Therefore, males were the victims of dog bite accidents more than twice as frequently as females. This finding is consistent with the observation that males are more frequently involved in most types of accidents than females (7). This striking sex difference in the incidence of dog bites becomes apparent before the victims reach 5 years of age. Perhaps the high incidence of dog bites among males results from their more aggressive behavior and the fact that males are more likely to have dogs as pets. Generally, females prefer cats or other small animals as pets. Males had higher rates of dog bites in practically every age group (table 1).

Age. The victim's age was an important variable in dog bites. Eighteen percent of all victims were less than 5 years of age, 31 percent of the victims were 5 to 9 years old, and 27 percent were 10 to 19 years of age. Thus, 76 percent of all the victims were less than 20 years of age. For the most part this group consisted of preschool and school children. The rate of dog bites per 10,000 population provides a more meaningful measure of high-risk groups by age. School boys and girls aged 5 to 9 years have the highest bite rate (table 1). The second highest bite rate for males was found in the age group 10 to 19 years, whereas the second highest rate among females was in the less-than-5-year-old group. Children and youths less than 20 years of age have the highest rate because they are intimately associated with dogs as pets, they are often abusive to pets, and, in many instances, they do not know how to care for pets properly. In addition, persons less than 20 years of age are more likely to be engaged in

Table 1. Incidence of dog bites in Pittsburgh, Pa., July and August 1958

Age group (years)	Males			Females		
	Population at risk ¹	Number bites reported	Rate per 10,000	Population at risk ¹	Number bites reported	Rate per 10,000
0-4.....	31,390	101	32.17	30,623	73	23.84
5-9.....	25,123	185	73.63	24,566	104	42.33
10-19.....	41,743	184	44.07	41,714	68	15.21
20-29.....	54,655	38	6.95	60,358	10	1.66
30-39.....	50,787	40	7.88	56,375	9	1.60
40-49.....	44,069	44	9.98	47,358	19	4.01
50-59.....	39,312	22	5.60	39,184	10	2.55
60-69.....	26,999	8	2.96	27,676	10	3.61
70 and over.....	14,329	17	11.86	17,545	5	2.85
Total.....	328,407	639	19.46	348,399	308	8.84

¹ Based on the 1950 U.S. census of the population of Pittsburgh, Pa.

activities which excite dogs, such as playing ball, running, riding bicycles, and delivering newspapers.

Race. There were 540 white males and 99 nonwhite males and 263 white females and 45 nonwhite females bitten by dogs. Although there were more bites among whites than nonwhites, the incidence of bites per 10,000 population at risk was higher for the nonwhites. The nonwhite population of Pittsburgh is not large and is composed primarily of Negroes. The rates of bites per 10,000 population was 18.75 for white males compared with 24.48 for nonwhite males, and 8.60 for white females compared with 10.58 for nonwhite females. There were no significant differences between the bite rates of the whites and the nonwhites, for both sexes, up to the age of 20 years.

From 20 through 49 years of age the nonwhites had a high rate of dog bites. This finding was associated with the occupations of the victims. Most of the nonwhite victims in this age range were employed in occupations which brought them to the dog owner's home in their jobs as delivery men, mailmen, milkmen, laborers, and garbage collectors. There was no evidence to suggest that nonwhites were more likely to report dog bites than whites, nor that dogs were more partial to biting nonwhite than white persons. The higher rate of dog bites among Negroes in Pittsburgh is in agreement with data obtained from a survey of dog bites in Arlington, Va. (8).

Occupation. Definite groups of individuals run a high risk of being bitten by dogs. School children and preschool children were the most frequent victims, especially if they either owned a dog or lived within three houses of a dog owner's home (table 2). Persons coming to the dog owner's home in the line of work also were frequently bitten. If newspaper boys and mailmen were included in this group, then 13 percent of all the victims were in this occupational category. During July and August 1958, 33 newspaper boys and 26

Table 2. Occupations of dog bite victims, Pittsburgh, Pa., July and August 1958

Occupation	Persons bitten		Number previous dog bites last 5 years
	Number	Percent	
School child.....	414	44	27
Preschool child.....	239	25	21
Persons coming to house in line of work ¹	56	6	2
Housewife.....	50	5	2
Newspaper boy.....	33	4	2
Mailman.....	26	3	3
Police or fireman.....	7	<1	0
Veterinarian.....	6	<1	5
All others.....	116	.12	0
Total.....	947	100	62

¹ Delivery man, 12; milkman, 12; gardener, plumber, painter, meter reader, 12; salesman, insurance collector, 11; utility man, laborer, 6; and garbage collector, 3.

factors associated with dog bites, and to determine if these factors indicate ways to prevent and control dog bites.

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When the dog inflicting the bite was traced, its owner was asked to supply additional information to identify the factors associating the animal with the dog bite accident. These factors are described on pages 898-903.

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Characteristics of Victims

Sex. The bimonthly incidence of dog bites per 10,000 population was 19.46 for males and 8.84 for females. Therefore, males were the victims of dog bite accidents more than twice as frequently as females. This finding is consistent with the observation that males are more frequently involved in most types of accidents than females (7). This striking sex difference in the incidence of dog bites becomes apparent before the victims reach 5 years of age. Perhaps the high incidence of dog bites among males results from their more aggressive behavior and the fact that males are more likely to have dogs as pets. Generally, females prefer cats or other small animals as pets. Males had higher rates of dog bites in practically every age group (table 1).

Age. The victim's age was an important variable in dog bites. Eighteen percent of all victims were less than 5 years of age, 31 percent of the victims were 5 to 9 years old, and 27 percent were 10 to 19 years of age. Thus, 76 percent of all the victims were less than 20 years of age. For the most part this group consisted of preschool and school children. The rate of dog bites per 10,000 population provides a more meaningful measure of high-risk groups by age. School boys and girls aged 5 to 9 years have the highest bite rate (table 1). The second highest bite rate for males was found in the age group 10 to 19 years, whereas the second highest rate among females was in the less-than-5-year-old group. Children and youths less than 20 years of age have the highest rate because they are intimately associated with dogs as pets; they are often abusive to pets, and, in many instances, they do not know how to care for pets properly. In addition, persons less than 20 years of age are more likely to be engaged in

probably somewhat less than 10 percent of all dog bites produce moderately severe and severe injuries.

Few human fatalities result from dog bites. During 1955 there were only 10 human deaths in the United States from dog bites (1). It is of interest that the percentages of moderately severe and severe injuries according to the anatomic sites were head, face, and neck, 26 percent; upper extremities, 11 percent; and lower extremities, 4 percent. This phenomenon seems indirectly related to the amount of protective clothing worn over these parts of the body.

The head, face, and neck are usually uncovered, while shoes, socks, skirts, and trousers afford some protection to the lower extremities. In this study, only 2 of the moderately severe and severe dog bite wounds on the extremities required subsequent plastic surgery, while 13 of those on the head, face, and neck did. Other studies are in agreement that a high proportion of dog bite wounds requiring surgical and plastic surgical procedures are on the head, face, and neck (9, 10).

Mechanism of bite accidents. One of the most interesting aspects of dog bites is the manner in which they occurred. A recent study of mammalian bites among young children indicated that often the child—and not the animal—provoked the bite (11). To elicit the causes, the victim's account of the circumstances of the bite was compared with the dog owner's account of how the bite happened. It was felt that the owner's views might present the dog's side of the story. The dog owners were eager to cooperate in this study, expressed sympathetic concern for the victims, and, with two exceptions, displayed no hostility. About one-third (32 percent) of the owners stated that they witnessed the dog bite accident, and an additional 13 percent of the dog bite accidents were seen by another member of the family or by a neighbor. Therefore, about one-half of the dog bite accidents were witnessed by a person other than the victim.

The mechanisms of bite accidents fall into four major categories: (a) bites unprovoked by humans; (b) bites incurred while petting or playing with dogs; (c) bites precipitated by human activities; and (d) all others (table 4). In only 9 percent of the bites did the dog own-

Table 4. Victims' accounts of circumstances of dog bite accidents, Pittsburgh, Pa., July and August 1958

Victim's account of dog bite	Dog bites	
	Number	Percent
Bites unprovoked by man-----	335	35
Bitten while visiting home in line of work-----	56	6
Bitten while delivering newspaper-----	33	3
Bitten while delivering mail-----	26	3
All other unprovoked attacks-----	220	23
Bitten while petting or playing with dogs-----	347	37
Petting or playing with dog-----	229	24
Riding bicycle, motor scooter, vehicle-----	44	5
Child running while playing-----	33	4
Playing ball with dog-----	23	2
Playing with chained dog-----	18	2
Bites precipitated by human activities-----	237	25
Feeding dog-----	67	7
Abusing or teasing dog-----	59	6
Separating fighting dogs and cats-----	28	3
Accidentally stepping or falling on dog-----	19	2
Picking up or holding dog-----	16	2
Helping injured animal-----	16	2
Playing roughly with dog's owner-----	11	1
Picking up pup-----	11	1
Abruptly arousing sleeping dog-----	10	1
All others-----	28	3
Total-----	947	100

ers disagree with the victim about how the bite happened. Approximately 4 percent of bites unprovoked by man and 5 percent of the bites incurred while petting or playing with dogs were attributed by the owners to abusing and teasing the dog or to trespassing. Taking these differences into account, it seems reasonable to state that about one-third of the bite accidents resulted from dogs biting maliciously without human provocation; one-third, while the victims were petting or playing with dogs; and one-third, when human activities provoked the dogs to bite.

Environmental Factors

There is a definite biological pattern for dog bites just as there is a comparable pattern for

mailmen were bitten by dogs in Pittsburgh. Projection of these findings to a national level indicates that probably tens of thousands of newspaper boys and postmen are bitten by dogs in this country annually. Veterinarians and their assistants also would appear to be frequent victims of dog bites. For example, of the six veterinarians bitten during this 2-month period, five, or 83 percent, stated that they had suffered previous dog bites during the past 5 years.

The percentages of individuals in the various occupational groups who experienced previous dog bites in the past 5 years were mailmen, 11; preschool children, 9; school children, 6; newspaper boys, 6; housewives, 4; and persons coming to the house in the line of work, 4. These findings further demonstrate the frequency of dog bites in these occupational groups. Measures to prevent and control dog bites should be directed toward these high-risk occupational groups.

Anatomic part bitten. As one might suppose, most dog bites (76 percent) were inflicted on the extremities, 39 percent on the legs and 37 percent on the arms. This anatomic distribution of bites is consistent with the height of dogs in relation to man, with the fact that people use their arms and legs to ward off attacking dogs, and with the observation that the extremities provide a better biting surface for dogs than the trunk.

It is shocking that 151, or 16 percent, of the dog bites occurred on the victim's head, face, and neck. With four exceptions, all of these potentially disfiguring bites about the head, face, and neck occurred among children less than 12 years of age. In a community survey of dog bites in Arlington, Va., 17.8 percent of the bites were located on the head and neck of the patients (8). One investigator reported that 25 percent of all dog bites treated in a general hospital were on the head and neck of the victims (9). Only 33, or 4 percent, of the 947 dog bites were on the buttocks and lower back.

Severity of wounds. Prior to this study, little was known about the severity of the wounds resulting from dog bites. The concept of a biological gradient was used for classifying the severity of dog bites. At the two extremes of

the gradient are dog bites which produce no detectable injury and those which result directly or indirectly in the death of the individual. Wounds were classified according to severity as (a) none—dog bites producing no detectable injury; (b) minor—dog bites producing abrasions, lacerations, contusions, and puncture wounds which would not have required sutures if the wound had been produced by ordinary trauma (not an animal bite); (c) moderate—wounds which would have required from 1 to 10 sutures if they had resulted from trauma; and (d) severe—wounds which would have required more than 10 sutures if they had resulted from trauma.

Of the 947 reported dog bites, 20, or 2 percent, produced no detectable injury; 831, or 88 percent, resulted in minor injuries; 86, or 9 percent, were moderate injuries; and only 10, or 1 percent, were severe injuries (table 3). There were no fatal injuries. Dog bites which result in no detectable injury probably occur in greater numbers than indicated in this study because these patients do not often seek medical treatment. Also, it seems likely that many persons with minor injuries resulting from dog bites fail to seek medical treatment. Therefore,

Table 3. Anatomic location and severity of dog bite wounds of victims, Pittsburgh, Pa., July and August 1958

Location of wound	Severity of wounds ¹				Total	
	None	Minor	Moderate	Severe	Number	Percent
Upper extremities.....	7	304	37	3	351	37
Lower extremities.....	9	345	15	1	370	39
Head, face, and neck.....	1	110	34	6	151	16
Trunk, excluding back.....	0	42	0	0	42	4
Back and buttocks.....	3	30	0	0	33	4
Total.....	20	831	86	10	947	100

¹ None—dog bite, no detectable wound; minor—abrasions, lacerations, contusions, and puncture wounds which would not have required sutures if they had resulted from trauma (not an animal bite); moderate—wounds which would have required 1–10 sutures if they had resulted from trauma; severe—wounds which would have required more than 10 sutures if they had resulted from trauma.

Table 6. Day of week and time of day dog bite accidents occurred, Pittsburgh, Pa., July and August 1958

Time of day	Mon-day	Tues-day	Wednes-day	Thurs-day	Friday	Satur-day	Sunday	Total	
								Number	Percent
6-11:59 a.m.	12	29	36	14	21	12	17	141	15
12-5:59 p.m.	51	44	41	56	60	50	59	361	38
6-11:59 p.m.	43	65	48	48	60	66	58	388	41
12-5:59 a.m.	0	5	6	0	8	2	3	24	3
Unknown	6	4	7	4	0	8	4	33	3
Total	112	147	138	122	149	138	141	947	100

ported by clinical impressions of epidemics of dog bites during the summer months and by popular notions of dog days. There is reason to believe that this seasonal variation of dog bites is nationwide; however, it is probably not as distinct in the southern parts of the country. The high incidence of bites during the summer months more likely resulted from more children being "exposed" to dogs at this time. Also, in colder climates dogs are allowed more freedom during summer months.

During the winter (school) months most dog bites occurred on Saturday and Sunday (1). However, during the summer months there was little variation in the frequency of bites by days of the week (table 6). Of 947 reported bites, 141, or 15 percent, happened from 6 to 11:59 a.m.; 361, or 38 percent, from 12 to 5:59 p.m.; 388, or 41 percent, from 6 to 11:59 p.m.; and 24, or 3 percent, from 12 to 5:59 a.m. The time was unknown for 33, or 3 percent, of the bites. Of course, not many dog bites would be expected from 12 to 5:59 a.m., but it is difficult to explain why only 15 percent of the bites occurred from 6 to 11:59 a.m. Most dog bites (79 percent) happened between noon and midnight.

Discussion

This study of the epidemiology of dog bites would seem to indicate that human factors are more important than environmental factors in the genesis of dog bites. Most environmental factors associated with dog bites reflect man's activity at a particular place or time rather than specific effects of environment per se.

However, the geographic distribution of bites by city wards points out areas where intensive control measures should be carried out.

On the basis of human factors which were unveiled in this study, certain recommendations for the prevention of dog bites can be made:

- Do not give a dog to children under the age of 6 years. This might help eliminate about 18 percent of the bites.
- Teach children how to care for their pets and not to abuse or tease dogs.
- Discourage playing ball with a dog, riding bicycles and other vehicles in the vicinity of excited dogs, and running while playing with a dog, if it excites him. These measures might prevent about 10 percent of all dog bites.
- Do not pet, startle, or take food away from a dog while feeding him and do not intercede in dog fights. These suggestions might eliminate another 10 percent of the bites.
- Exercise caution while assisting injured and sick animals, avoid abruptly arousing sleeping dogs, and be careful in picking up pups so as not to offend the mother dog. These measures might prevent another 3 percent of all bites.

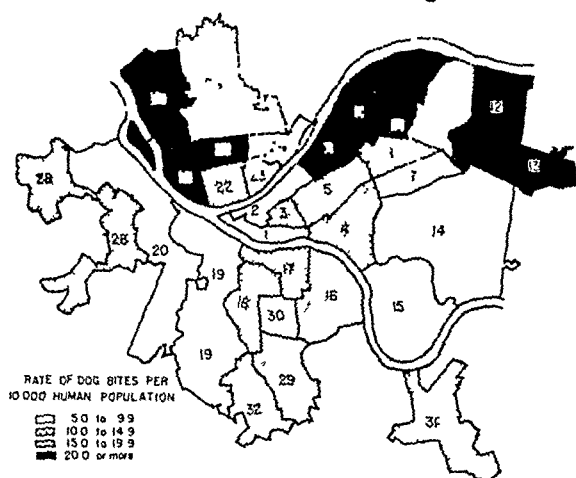
- Avoid holding your face next to a dog's to prevent disfiguring facial wounds.

Admittedly, these preventive measures are confining for dog owners, but they are suggested on the basis of scientific facts, and if they were followed, about 40 to 50 percent of all dog bites might be prevented.

Summary

An epidemiological study was made of 947 dog bite accidents which occurred in Pitts-

Geographic distribution of dog bites by wards in Pittsburgh, Pa., July and August 1958



other types of animal bites (6, 12). Some of the environmental conditions investigated in this study were the geographic distribution of bites by city wards, the relation between bites and proximity to the dog owner's home or the victim's home, the seasonal variation of bites, and the frequency of bites according to days of the week and hours of the day.

Geographic location. To test the hypothesis that dog bites occur more frequently in residential areas than in business and industrial areas of the city, the incidence of dog bites by city wards was calculated by tracing the address where the bite was reported to have happened.

Estimates of the 1957 population rather than the 1950 census, which does not reflect recent population movement within the city, were used to calculate the incidence of dog bites per 10,000 human population for the 32 wards of Pittsburgh during the study period (see chart).

Wards 1 and 2 are downtown business areas of Pittsburgh which had less than 10 bites per 10,000 population. The wards with the highest rates of bites (6, 9, 10, 12, 13, 21, 25, and 27) are primarily residential; industrial areas (17, 19, and 20) had relatively low rates. Some of the differences in rates among wards may be due to differences in dog populations. Poor reporting in some wards was not thought to be a major bias influencing the incidence of bites.

These findings reflect the fact that dog bite accidents are most prevalent in areas where homes are most abundant, and children, the

most frequent victims, and dogs are more common.

The report forms also indicated that most bite accidents happened in the vicinity of the dog owner's residence rather than the victim's (table 5). Vicinity included inside the home, the yard, and the street in front and back of the home; neighborhood was the area within 2 blocks' radius of the home. In the study, 65 percent of the accidents occurred in the vicinity of the dog owner's home, 18 percent in the neighborhood near the dog owner's home, and 9 percent in the vicinity of the victim's home. Most of the dogs responsible for bites which occurred away from the neighborhood of the dog owner's home and the victim's home were difficult to trace. Presumably, a large proportion of these animals were stray dogs.

Seasonal variation. In a previous publication (1) we demonstrated a seasonal distribution for dog bite accidents in Pittsburgh. The incidence of bites was lowest during the winter months, increased during March and April, and reached a peak during the summer months. A similar seasonal distribution of dog bites was reported for Arlington, Va. (8), and for Ann Arbor, Mich. (9). These observations are sup-

Table 5. Places where dog bite accidents occurred, Pittsburgh, Pa., July and August 1958

Place of accident	Dog bites	
	Number	Percent
Vicinity of dog owner's home.....	612	65
In dog owner's yard.....	358	38
Street in front or behind owner's yard.....	120	13
Inside owner's house.....	87	9
On porch of owner's house.....	17	5
In neighborhood ¹ near dog owner's home.....	166	18
Vicinity of victim's home.....	83	9
In victim's yard.....	53	6
Street in front of or behind victim's yard.....	19	2
Inside victim's house.....	11	1
On sidewalk or street not near owner's or victim's home or neighborhood ¹	37	4
Park or playground.....	20	2
Animal hospital.....	6	<1
All others.....	23	2
Total.....	947	100

¹ Area within 2 blocks' radius of home.

large proportion of the dogs which could not be traced were strays. Of those traced to owners, 571, or 74 percent, were licensed, and 196, or 26 percent, were not. This study was concerned primarily with the 571 dogs which were traced to owners and had dog licenses, but many of the findings apply to the unlicensed dogs with owners.

Sex. Of the licensed dogs inflicting bites, 416 were males and only 155 were females (table 1). If the licensed dog population at risk were unknown, it would be easy to assume that males are more likely to bite people than females. This was not true. Licensed female dogs had a bite rate of 4.1 per 100 dogs, whereas males had a bite rate of only 2.7 per 100 dogs. Contrary to popular opinion, this sex difference in bite rates was not related to the females caring for newborn pups as only 11, or 7 percent, of the 155 bites happened while the victim was playing with a pup. Only one bite by a female dog was reported to have occurred while the dog was in its oestrous cycle. Apparently city dwellers prefer owning male dogs, since 15,579 licenses were issued for male dogs and only 3,755 for female dogs. There is no evidence to suggest that a dog owner is more likely to obtain a license for a male dog.

Age. Dogs less than 6 months of age do not require a license in Pittsburgh. It is interesting that more than 50 percent of the licensed dogs were less than 5 years old (table

1). A vast majority (80 to 85 percent) of the licensed dogs of both sexes were from 1 to 9 years of age, and only about 10 percent were 10 years of age or over. A striking finding is that younger dogs are more likely to bite people than older dogs. This was particularly true for dogs between 6 and 11 months of age. A smaller proportion of dogs 5 years of age or over bite humans than would be expected. Perhaps younger dogs experience difficulty in adjusting to their domestic status. In effect, they have not been trained how to behave toward people. Young dogs in intimate association with young children would seem to invite frequent dog bite accidents.

Breeds. One of the most important hypotheses tested is that certain breeds of dogs are more likely to bite people than other breeds. Veterinarians from time to time have expressed clinical impressions about the temperament of certain breeds of dogs, but, as far as we know, there have been no previous studies to confirm these impressions in relation to dog bites.

The recognized breeds of dogs were arranged into six groups, a modification of the American Kennel Club classification (13). Mixed breeds and unrecognized breeds were listed as additional groups. Grouping the many breeds of dogs in these large categories was the only practical way to handle the data, and thousands of dog bite cases would have been required to demonstrate significant differences in

Table 1. Age and sex of licensed dogs inflicting bites, Pittsburgh, Pa., July and August 1958

Age of dog	Males			Females		
	Dogs inflicting bites		Percent in total licensed dog population	Dogs inflicting bites		Percent in total licensed dog population
	Number	Percent		Number	Percent	
0-5 months.....	¹ 18	4.3	(2)	¹ 12	7.7	(2)
6-11 months.....	54	13.0	4.2	21	13.6	7.3
1-4 years.....	200	48.1	49.0	77	49.7	47.3
5-9 years.....	114	27.4	36.8	38	24.5	34.3
10-14 years.....	20	4.8	9.0	5	3.2	11.1
15-19 years.....	3	.7	.5	0	-----	-----
Unknown.....	7	1.7	.5	2	1.3	-----
Total.....	416	100.0	100.0	155	100.0	100.0

¹ Unlicensed dogs less than 6 months old traced through bite report forms.

² Licenses not required for dogs less than 6 months old.

burgh, Pa., during July and August 1958. The incidence of bites per 10,000 human population was 19.46 for males and 8.84 for females; 76 percent of the victims were less than 20 years of age. The rate of bites was higher for non-whites than for whites.

High-risk groups identified were: school children, preschool children, persons coming to the dog owner's house in the line of work, newspaper boys, mailmen, and veterinarians.

Seventy-six percent of the bites were inflicted on the extremities, 16 percent on the head, face, and neck, and 8 percent on the trunk. Only about 10 percent of the bites were moderately severe or severe. There were no fatal dog bites. A high percentage of facial wounds required subsequent plastic surgery.

About one-third of the bite accidents resulted from dogs biting maliciously without human provocation, one-third happened while the victims were petting or playing with dogs, and one-third were attributed to human activities which caused the dogs to bite.

The following environmental factors were identified: the incidence of bites was higher in residential than in business or industrial areas of the city; 65 percent of the bites happened near the dog owner's home, 18 percent in the neighborhood near the owner's home, 9 percent near the victim's home, and the remaining 8 percent occurred elsewhere in the city; most dog bites happened during the spring and summer months; and 79 percent of the bite accidents occurred between noon and midnight.

Characteristics of Biting Dogs

PRACTICALLY NOTHING is known about the characteristics of dogs which bite man. The question of how the dogs involved in dog bite accidents differ from other dogs is as important to the veterinary epidemiologist studying dog bites as determining the classification, type, and strain of a bacterial agent is to a microbiologist.

In an epidemiological study of 947 dog bite accidents which occurred during July and August 1958 in Pittsburgh, Pa., we tried to determine what breeds of dogs are most likely to bite people, to elicit other characteristics, such as age and sex, of the dogs associated with accidents, and to find the pertinent animal factors which are necessary for planning an adequate dog bite and rabies control program.

In this study the name and address of the owner of the dog were obtained from the dog bite report forms sent in by hospitals and physicians treating bites. When this information was not available from the report form, the Allegheny County Health Department and the Pittsburgh Police Department traced the dog owners. They were requested to complete a questionnaire supplying the following information: the name and address of the owner;

the age, sex, and breed of the dog; number of times the dog had bitten other people within the past year; vaccination against rabies and date; possession of a 1958 dog license and the number of the license; involvement in frequent dog fights; the circumstances of the bite accident as the owner understood it; and whether the owner witnessed the bite accident.

One serious limitation to all dog population estimates is the unknown number of stray dogs. This statistical problem was circumvented by limiting the study to licensed dogs.

According to the records of the Pittsburgh Dog Licensing Bureau, 19,334 dog licenses were issued as of September 1, 1958, 15,579 for male dogs and 3,755 for female dogs. The rates of bites inflicted by licensed dogs were computed using 19,334 as the population base. Information about the age, sex, and breed was obtained by studying a 2 percent random sample of the total licensed dog population.

Incidence

Of the 947 dogs inflicting bites, 767, or 81 percent, were traced to owners, and 180, or 19 percent, could not be traced. Presumably, a

large proportion of the dogs which could not be traced were strays. Of those traced to owners, 571, or 74 percent, were licensed, and 196, or 26 percent, were not. This study was concerned primarily with the 571 dogs which were traced to owners and had dog licenses, but many of the findings apply to the unlicensed dogs with owners.

Sex. Of the licensed dogs inflicting bites, 416 were males and only 155 were females (table 1). If the licensed dog population at risk were unknown, it would be easy to assume that males are more likely to bite people than females. This was not true. Licensed female dogs had a bite rate of 4.1 per 100 dogs, whereas males had a bite rate of only 2.7 per 100 dogs. Contrary to popular opinion, this sex difference in bite rates was not related to the females caring for newborn pups as only 11, or 7 percent, of the 155 bites happened while the victim was playing with a pup. Only one bite by a female dog was reported to have occurred while the dog was in its oestrous cycle. Apparently city dwellers prefer owning male dogs, since 15,579 licenses were issued for male dogs and only 3,755 for female dogs. There is no evidence to suggest that a dog owner is more likely to obtain a license for a male dog.

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Breeds. One of the most important hypotheses tested is that certain breeds of dogs are more likely to bite people than other breeds. Veterinarians from time to time have expressed clinical impressions about the temperament of certain breeds of dogs, but, as far as we know, there have been no previous studies to confirm these impressions in relation to dog bites.

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5-9 years.....	114	27.4	36.8	38	24.5	34.3
10-14 years.....	20	4.8	9.0	5	3.2	11.1
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Total.....	416	100.0	100.0	155	100.0	100.0

¹ Unlicensed dogs less than 6 months old traced through bite report forms.

² Licenses not required for dogs less than 6 months old.

bites among the individual breeds. Owing to the larger number of breeds in each group, the following levels of confidence were set: probably significant when $P = < 0.05$; significant when $P = < 0.01$; highly significant when $P = < 0.001$.

Most people in Pittsburgh own dogs of mixed breeds (table 2). Hounds, terriers, and sporting dogs ranked next in popularity. The large number of mixed breeds with licenses would seem to suggest that people obtain licenses for these dogs about as often as they do for dogs of recognized breeds. The data in table 2 indicate that working dogs are much more likely to bite people than any other group. The working dog group includes the following well-known breeds: boxers, collies, Eskimo dogs, German shepherd dogs, great Danes, Saint Bernards, and Doberman pinschers. For this group 48 bites were expected, but 90 were reported, indicating a highly significant difference.

Sporting dogs inflicted more bites than were expected (59 expected, 75 reported). This difference is probably significant ($P = < 0.05$). The sporting dog group includes various breeds of pointers, setters, retrievers, and spaniels. On the other hand, hounds bite fewer people than would be expected (82 expected, but only 34 reported). These findings indicate that hounds are relatively safe dogs to own. No significant differences in the frequency of bites could be demonstrated for mixed breeds, terriers, toys, nonsporting dogs, and unrecognized

breeds. It was not possible to single out an individual breed as being particularly vicious. This preliminary study, however, suggests that such breeds probably do exist and that additional studies along this line of inquiry may prove fruitful.

Behavior. To determine whether a pet was a chronic offender, a history of the previous biting experience of dogs involved in bite accidents was sought from owners. Victims were also asked about the animal's history because owners can be unaware that their pets have inflicted a bite, and a victim may know of others bitten by the same dog.

The dog owners volunteered the following information about the number of bites their dogs had inflicted during the past year. Forty-seven dogs inflicted 2 bites; 16 dogs inflicted 3 bites; 1 dog, 4 bites; and 4 dogs, 5 bites. Most of the dog owners expressed considerable concern about what to do with dogs that were chronic biters. On the other hand, the victims stated the dog which bit them had bitten the following number of persons (including the victim) in the last year: 83 dogs bit 2 people; 2 dogs bit 3 people; and 1 dog bit 8 people. Fifteen percent of the dog owners did not agree with the victims' statements. However, it was apparent that some dogs are notorious for biting people.

Only 15 of the owners stated that their dogs were involved frequently in dog fights. If these impressions of dogs' pugnacious behavior toward other dogs are correct, then there is no

Table 2. Distribution of bites inflicted by various groups of licensed dogs, Pittsburgh, Pa., July and August 1958

Groups of breeds ¹	Estimated licensed dog population ²	Number bites reported	Number bites expected	Test for significance— <i>P</i>
Mixed.....	9,376	271	277	< 0.70 but > 0.50
Sporting.....	2,011	75	59	< 0.05 but > 0.02
Hounds.....	2,765	34	82	< 0.001
Working.....	1,624	90	48	< 0.001
Terriers.....	2,243	57	66	< 0.30 but > 0.20
Toys.....	677	19	20	< 0.90 but > 0.80
Nonsporting.....	464	18	14	< 0.30 but > 0.20
Unrecognized.....	174	7	5	< 0.50 but > 0.30
Total.....	19,334	571	571	

¹ Classification of groups of breeds according to reference 13.

² Based on a 2 percent random sample of 19,334 licensed dogs in Pittsburgh, 1958.

relationship between dogs' behavior toward other dogs and their behavior toward people.

As mentioned previously in this study, approximately one-third of the bite accidents resulted from dogs biting maliciously without human provocation, one-third were incurred while the victims were playing with or petting dogs, and one-third resulted from human activities which goaded dogs to bite. These findings would seem to suggest that an interaction of overt behavior on the part of people and dogs figures in most (probably well over two-thirds) of the bite accidents.

Licenses and Immunity

Only 767 dogs, or 81 percent, could be traced to owners. The remaining 180, or 19 percent, either were strays or could not be traced. This finding would seem to indicate that Pittsburgh has a relatively large stray dog population. Only 74 percent of the dogs which could be traced to owners had dog licenses. A more active campaign of dog licensing and dog catching is needed to control the stray and unlicensed dogs.

Only 264, or 34 percent, of the animals traced¹ to owners had been vaccinated against rabies. Of these, 57, or 22 percent, had not been given booster injections within the past 3 years. Most dogs (468 or 61 percent) had not been vaccinated against rabies, and 35, or 5 percent, of the owners did not know the status of their dog's immunity. As one might expect, a higher proportion of dogs with licenses had been vaccinated than dogs without licenses. Probably a high proportion of the 180 dogs which could not be traced have not been vaccinated.

Improved vaccines are available for active immunization (14,15). Adequate control measures plus mass rabies vaccination of the canine population has been shown an effective means of eliminating canine rabies from a community (16). Although no human rabies and only one case of animal rabies have been reported in Pittsburgh or Allegheny County during the past 3 years, numerous cases have been reported from adjacent counties. At the present time, the canine population of Pittsburgh is largely susceptible to rabies and the soil is ripe for a rabies epidemic. On the basis of these findings,

a mass rabies immunization program is indicated, and legislation is needed to make rabies immunization a requirement for dog licensure. These recommendations are in accordance with those of the Expert Committee on Rabies of the World Health Organization (17).

Discussion

A study of the epidemiology of dog bites in the United States would seem important for the following reasons: between 600,000 and 1 million people are bitten by dogs every year (1); about 10 percent of all dog bites produce serious injuries although few result directly in human deaths; dogs are the primary source of human exposure to rabies; although only 10 to 20 people die of rabies in this country every year, about 50,000 individuals receive antirabies treatment (18); other diseases are transmissible from dogs to man through dog bites; and an immeasurable amount of anxiety and fear is experienced by parents when their child is bitten by a dog. On the other hand, dogs will probably continue to provide people with much pleasure and companionship. It seems reasonable to believe that many dog bites can be prevented when the facts about how they take place are known.

Inferences about the age, sex, and breed of the dogs were made by comparing the licensed dogs which bit people with the total licensed dog population of Pittsburgh (19,334 dogs). However, among the dogs which were traced there were no significant differences in the age, sex, and breed distributions of the 196 unlicensed dogs compared with the 571 licensed dogs. Therefore, there is reason to believe that the findings in this study may pertain to 767, or 81 percent, of the dogs which bit people. This observation would seem to increase the reliability of the data and support the validity of the findings. Poor reporting did not seem to be a major source of error, as it was felt that most dog bite accidents were reported. Biases in reporting a number of the items were corrected by comparing the victim's statements with the owner's statements. There was a surprisingly high degree of agreement in most instances.

Dog factors would seem to rank along with

human factors in the ecology of dog bites. Environmental factors occupied a relatively minor role. Female dogs inflicted a higher rate of bites per 100 (4.1) than male dogs (2.7). This difference could not be attributed to the oestrous cycle or nursing pups. Unfortunately, the question of spayed versus nonspayed females was not investigated. Young dogs were found more likely to bite people than were older dogs.

Perhaps the most striking finding is that certain breeds of dogs are more likely to bite people than other breeds. In this study, to facilitate analysis of the data, individual breeds were combined into groups of breeds, although there is a danger that the individual breed with a high rate of bites may be obscured by the rates of the other breeds in the group. Working dogs and sporting dogs clearly were reported to bite more people than would be expected. The differences between the expected and reported number of bites for these groups is probably significant. They did not result from age and sex variations within groups, and the circumstances of the bites did not account for these differences. There was not an unusually large proportion of bite accidents involving these breeds in which human acts provoked the dogs to bite. A random check of the records showed that improper classification of dogs by breeds was not a major source of bias. At this time, we are not able to single out individual breeds within the groups which are especially vicious. However, this preliminary study would seem to indicate that such breeds exist.

On the basis of the findings in this study, the following recommendations are suggested to dog owners.

- Try to avoid the combination of young dogs (less than a year old) around young children (less than 5 years old).

- When obtaining pets for children consider the fact that female dogs inflict more bites than male dogs.

- Restrain or dispose of dogs which consistently bite people.

- Immunize dogs against rabies, consulting a veterinarian for the proper schedule.

- Consult a physician in case of a dog bite.

- Obtain a license for each dog.

- Affix an identification tag to each animal's

collar, listing the dog's name and the owner's name and address.

- Don't permit dogs to roam at large in a heavily populated area.

Summary

Dog factors associated with dog bites in Pittsburgh, Pa., were studied by comparing the licensed dogs which bit people with the total licensed dog population of the city. Of 19,334 licensed dogs, 571, or 3 percent, bit people during July and August 1958.

Female dogs had a higher bite rate per 100 dogs than male dogs (4.1 and 2.7). The higher rate among female dogs could not be attributed to the oestrous cycle or to nursing pups.

Young dogs, 6-11 months of age, were found more likely to bite people than older dogs. Perhaps this finding is related to young dogs' lack of training and poor adjustment toward people.

Certain groups of dogs were found more likely to bite people than other groups. Working dogs were the chief offenders, with 48 bites expected and 90 bites observed. Also, sporting dogs bite people more often than would be expected. No individual breed could be singled out as especially vicious, but such breeds probably exist.

Some dogs are repeatedly involved in dog bite accidents. According to the owners and the victims, during 1 year between 47 and 83 dogs bit 2 people; at least 16 dogs bit 3 people; 1 dog bit 4 people; 1 dog bit 5 people; and 1 dog bit 8 people.

The findings in this epidemiological study of dog bites provided a factual basis for making recommendations to prevent and control dog bites.

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Florence Rena Sabin

A pioneer in physiology and public health has been selected by the State of her birth, Colorado, as one of its two representatives in National Statuary Hall of the Capitol of the United States (see frontispiece).

Florence Rena Sabin, born in Central City, Colo., November 9, 1871, was the first woman intern to be accepted by Johns Hopkins University, in 1900, after earning a doctorate in science at Smith College; the first woman to be professor in a medical school (histology at Hopkins); and the first woman to be president of the American Association of Anatomists (1924).

Renowned for contributions to the dynamic study of functional physiology, Dr. Sabin was also the first woman to be invited to join the staff of the Rockefeller Institute of Medical Research, where she served 13 years until her "retirement" at 67 in 1938. Then she began one of the most vigorous periods of her career.

As chairman of the health section of Colorado's postwar planning committee and city manager of health and charities in Denver, she led a successful campaign for "Health To Match Our Mountains," which culminated in 1947 with legislative and financial support of a new department of public health, construction of new hospitals, a widened medical school program, increased facilities for tuberculosis management, and a strengthened system of milk sanitation.

Signs

and

Symptoms

of trends in public health

A full program of progressive patient care has been established at Grant Hospital in Chicago with the opening of a new wing. The hospital now has three 6-bed wards for intensive care and one 18-bed wing for ambulatory self-care. Intermediate care is provided in the remaining wards.

» «

Trachoma in Mexicans in Southern California is under investigation by scientists assigned by the Communicable Disease Center of the Public Health Service.

» «

Properly designed and adequately fitted mouth protectors are urged for all youths engaged in contact sports by Dr. Gerard H. Schoen of the American School Health Association. He quoted a recent survey which showed that among a group of high school football players, 11 percent not wearing mouth protectors suffered dental injury while those with protectors escaped harm.

» «

The world's population is increasing at the rate of 45 million a year, according to the annual report of the United Nations Department of Economic and Social Affairs. The computation is based generally on an estimated annual birth rate of 34 per 1,000 and death rate of 18 per 1,000. Highest life expectancy was found in Norway where girls born now may expect to live to the age of 75, and boys may reach 71.

These and other statistics supplied by member governments are considered by the report's editors to be correct within a range of 75 to 98 percent.

The Declaration of Geneva rather than the Hippocratic Oath was taken at the first commencement exercises at Albert Einstein College of Medicine, Yeshiva University, New York City. Fifty graduating students pledged "not to use their medical knowledge contrary to the laws of humanity" or to "permit considerations of religion, nationality, race, party politics, or social standing to intervene between duty and patient."

» «

The virus laboratory of the division of laboratories, New Jersey Department of Health, is now housed in new quarters at the Madden Building, Donnelly Memorial Hospital, Trenton.

Complete equipment for virus isolation and serologic studies of virus diseases has been installed during the past year, including housing for large and small animals. In addition to diagnostic virology, laboratory areas have been set aside for research tied in with the department's epidemiological services.

E. L. Shaffer, Ph.D., is director of the division of laboratories, and Martin Goldfield, M.D., assistant director.

» «

Public opinion favors spending for medical research, according to a University of Michigan survey. Interviews of 1,500 Americans showed that, given a choice, 54 percent preferred medical research; 32 percent, efforts to combat juvenile delinquency; 7 percent, basic research in the sciences such as physics and chemistry; and only 3 percent, a program to put the first man on the moon.

A cooperative program of medical care for people on public assistance has resulted from joint action by practicing physicians, the department of public welfare, and the county health department in Russell County, Va., Dr. J. W. Jessee of Norton reports.

Three steps initiated the action. A screening facility was set up to determine the medical eligibility of welfare applicants. A medical advisory committee was formed to serve the department of public welfare. And the local health department arranged to coordinate medical services to the indigent sick.

A general medical clinic was opened in 1956 with local funds. State support was added after the clinic was designated as part of a statewide pilot study of coordinated medical care for the indigent sick.

Observations after 3 years of operation indicate there has been definite improvement of interworking relationships, opportunity for control and coordination of medical services to welfare patients, increased use of established health department programs, success in casefinding, and savings in costs both to the patient and to the community.

» «

A comprehensive water pollution abatement plan for New York's Finger Lakes Drainage Basin has been approved by the State water pollution control board. It calls for specific steps by 95 industries and 42 municipalities to bring waters of the basin up to established standards.

» «

Staff nurses are trained in epidemiology and communicable disease control in Butte County, Calif., through a series of lecture meetings featuring the work of the local department of health in a recent outbreak of *Salmonella* infections.

» «

In the absence of equipment or help from a second person, the American Red Cross endorses the mouth-to-mouth technique as the most practical method of artificial respiration regardless of age and cause of cessation of breathing.

Industrial **CONFERENCE REPORT** Health Today

Air pollution, radiation exposure, poisons, the impact of sound, and their resultant challenge to current industrial health practices were among the major topics at the 1959 Industrial Health Conference held in Chicago, April 27-May 1.

The conference is conducted as a joint annual meeting of five professional organizations: the American Conference of Govern-

mental Industrial Hygienists, the American Industrial Hygiene Association, the American Association of Industrial Dentists, the American Association of Industrial Nurses, and the Industrial Medical Association.

Of the 109 papers presented at the 5-day meeting of the American Industrial Hygiene Association, 16, selected for public health interest, are summarized here.

Planning for Radiation Accidents

The probability that accidents resulting in serious levels of radiation exposure will increase in the coming decade seems likely because of the tremendous growth in the use of this modality in industry. Prompt notification of the possibility that a radiation accident might have occurred is essential for the most effective handling of the situation. Rapid communication between health personnel and management is vital.

Once the event occurs, it is essential to restrict exposure from sources of radiation outside the body, from radioactivity on the body surface or within the body, or from a combination of these sources.

If radioactive elements are released, they can be disseminated rapidly. Evacuation and closure of the hazardous area must be carried out immediately. The first 12 hours are critical. Diagnostic studies should be instituted and decontamination procedures planned and started at once.

Monitoring of individuals in an emergency requires certain hematological studies as well as careful medical observation. Specific medical therapy depends on the levels of radiation and kinds of contamination found or suspected. Collection of specimens of blood, urine, feces, and breath may be needed to determine what particular radionuclides are at large.

The relationship between the physician and health physicist and administrative problems, particularly in relation to publicity, are especially important and require planning and

direction. If contamination threatens the general public, civic authorities have responsibilities to contain the danger.

Aid in radiation accidents is available from the Atomic Energy Commission and Department of Defense.—EUGENE L. SAENGER, M.D., *College of Medicine, University of Cincinnati, Ohio.*

Experience With Occupational Overexposure to Radiation

Nineteen incidents of excessive exposure to radiation have been reported to the New York State Labor Department since the promulgation of the State industrial code a little more than 3 years ago. Excessive exposure to radiation is defined in the code's rule 38 as a dose in excess of 3 rems during a 13-week period.

Eight of the reported incidents appear to have been false alarms. In seven, reports were based upon an erroneous measurement of exposure due to improper handling of radiation measuring devices. For example, excessive readings on several film badges resulted from their storage in a highly radioactive area. In the eighth incident, prompt evacuation of an area following an accidental spill of strontium-90 prevented overexposure. There was no discernible clinical evidence of injury in any of the eight instances.

The 11 other incidents were produced either through chronic low-level routine exposures ranging from 0.4 to 1.2 rems per week, exceeding the recommended limit of 3 rems per 13 weeks of penetrating radiations from radioactive material; or through acute high-level accidental exposures to X-rays or radioactive materials, with dosages ranging from 30 to 1,200 rems. Acute exposures were fortunately confined to noncritical areas of the body.

In three individuals exposed, radiation burns were determined to have originated after the code went into effect. Remedial measures have been taken in the plants where these exposures were reported.

The factors most frequently responsible for excessive exposures were lack of awareness of

the hazard, of proper supervision, of proper work techniques, and of adequate protective devices.—MORRIS KLEINFELD, M.D., AND ALBERT P. ABRAHAMS, *New York State Department of Labor, New York, N.Y.*

Protective Clothing at a Large Atomic Energy Installation

Protective clothing is worn at atomic energy facilities primarily to keep radioactive materials away from the body and to insure that contaminants are not inadvertently removed from controlled areas. This clothing is a vital but costly aspect of any radiological health program.

At the Savannah River plant, the investment in clothing and laundry facilities is sufficient to justify a continuous program for reducing this expenditure without compromising the necessary protective standards. Major effort has been directed toward evaluation and standardization of existing equipment, evaluation and development of new types of garments, and revision of laundering processes.

Projects which were successful in increasing the protective value of garments include:

- Testing and adoption of a new coverall fabric which provides greater protection against penetration of particulate matter.

- Development of water vapor permeability data which are used in the selection and specification of rubber and plastic garments.

- Evaluation and adoption of extra large cloth gloves, cloth shoe covers, and cloth boots which allow for shrinkage and which are fabricated with seams strengthened against holes and tears.

- Requirement of a large strap on coveralls and laboratory coats to permit pocket chambers and badge dosimeters to be worn in a central and consistent location.

Projects which have resulted in substantial savings without compromising protective standards include:

- Use of unbleached clothing.
- Elimination of unnecessary pockets on coveralls and laboratory coats.



Clothing worn in the laboratory at the U.S. Atomic Energy Commission's installation at Oak Ridge, Tenn., is monitored for evidence of radioactivity. Some laundry must be confined as waste, if it is found to be unsafe.

- Recovery of coveralls contaminated to slightly above normal reuse limits to serve as outer "throwaway" garments following work in highly contaminated areas.

- Development of a two-piece plastic suit which is far less expensive than the previously used one-piece suit.

- Development of a process for satisfactorily recovering contaminated surgeons' gloves for reuse.

In addition to continuously evaluating newly developed and marketed products, future work includes establishment of a program to dry-clean and reclaim contaminated leather gloves.

This information was developed during the course of work with the Atomic Energy Com-

mission under contract AT (07-2)-1.—R. W. VAN WYCK AND H. L. BUTLER, *E. I. duPont de Nemours and Co., Aiken, S.C.*

Survey of Radiation Received by Dentists and Dental Assistants

A 9-year survey of personnel engaged in dental radiography in New England, when compared with similar surveys of physicians using X-rays, showed that dentists and dental technicians rank third among the health professions in weekly dose received.

The survey was accomplished by using film badges worn on the lapel or carried in a pocket, and an attempt was made to maintain the same relative distance from the floor. Ionization survey meters were used to check the installation and the pattern of scatter.

Analysis of 3,134 badges from 233 dental offices and 3 clinics showed the following results for an average 2-week period:

<i>Exposures</i> (in milliroentgens)	<i>Personnel monitored</i> (approximate percent)
0-9.....	17
10-99.....	50
100-199.....	20
200-299.....	10
Over 300.....	3

Exposures of more than 200 milliroentgens were due largely to carelessness and the shortcuts taken by technicians working under pressure. Many dental radiography units had no added filtration and most were not properly diaphragmed. Rooms were usually small, thus precluding the possibility of using distance as a protective measure.

A phantom was used to take radiation measurements, but the many applicable variables made it impossible to determine the least hazardous operating position for dental personnel. The only safe place is outside the room. Second choice for safety is a position away from the zone of scattered radiation, less than 120 degrees from the primary and at least 3 feet from the X-ray tube head.

After checking installations for scattered radiation, reevaluation by film badges, proper utilization of filters and diaphragming, and advice to personnel on safer procedures, there was an appreciable decrease in milliroentgens received by the dental personnel surveyed.—
CHARLES K. SPALDING AND RUSSELL F. COWING,
New England Deaconess Hospital, Cancer Research Institute, Boston, Mass.

Engineering Efforts in Noise Control

Modern high-speed equipment, powerful automatic machines, jet engines, and rockets have drawn attention to the need to protect the hearing of operating personnel from destructive

effects of noise. Concerted efforts have been organized to define the acceptable limits of noise exposure, to control noise, and to protect personnel.

The risk of hearing impairment associated with any given noise depends not only upon the noise level but also upon the length of exposure. In evaluating a working environment and in choosing suitable steps to reduce exposure to noise for operating personnel, it is necessary to consider noise levels throughout the field of operation, the work schedule, and the movements of the operator.

When a new plant or process is being considered, advance planning helps to achieve effective and inexpensive noise control. A careful choice of machine location, plant design, and construction materials at the planning stage can reduce the noise hazard significantly and may eliminate it completely. Modifications required for noise control can be made more effectively on the chosen machines or processes before installation is completed.

If a plant or process is in operation, noise exposure may be reduced by revising work patterns, by using corrective acoustic design, or by protective devices. Relocation of an operator, even by a few feet, may reduce his exposure to noise significantly or may permit the use of measures which would be ineffective in the previous position. Modifications to a machine or the provision of effective noise shields requires careful design engineering, but basic noise control principles have been developed which can simplify the design procedure.

For example, if the person to be protected is close to the source of noise, an enclosure for the source or even a partial enclosure or a baffle will be effective in reducing the direct sound by reflecting it away from the listener. In this position, however, the addition of acoustic tile to the ceilings or walls will provide little relief since such material will reduce the reflected sound only, and this sound is already low in comparison with the direct sound. Conversely, when the person is far from the source, acoustic absorption spread around the room may be quite effective.

Ear muffs, ear plugs, or similar ear protective devices are generally the least desirable noise control technique because of the inconvenience

and difficulties inherent in obtaining proper fit and adjustment. Sometimes, however, they are the only practical solution.

When processes and machines are intrinsically noisy and their functions cannot be dissociated from their noise output, a realistic answer may be found in the use of automation and remote control.—CLAYTON H. ALLEN, PH.D., *Bolt, Beranek & Newman, Cambridge, Mass.*

Medical Critique of Noise Control

In 1947, there was an abrupt increase in the number of compensation hearing loss claims in the State of New York. Shortly thereafter, many similar claims were filed in New Jersey, Wisconsin, and other States. Despite these developments, the hearing hazard has awakened little concern in a large number of industrial plants.

Improper and unsatisfactory hearing conservation programs may be due to many factors. To mention a few, they include poor planning, noisy testing environments, the use of improperly trained technicians, questionable testing techniques, unsatisfactory recording, and particularly the lack of proper medical supervision.

There are industries which have purchased audiometers and turned them over to nurses or safety personnel with instructions to make "hearing tests." These records are merely filed for use in the event of future claims. No provisions are made for adequate training of the personnel conducting the tests, for medical supervision, or for proper interpretation. Any hearing conservation program without medical supervision must be considered inadequate.

For industrial hearing testing programs, a simple discrete air conduction audiometer properly calibrated and maintained is all that is required. This audiometer may be a small portable or an office model. Additional equipment, such as bone conduction, speech circuits, and masking, are not essential for implant testing. The hearing test performed should be a pure tone air conduction threshold audiogram, not to be confused with so-called screening

tests which use a single- or two-frequency technique and are intended for recheck or periodic examinations.

Poor planning and the use of elaborate equipment and testing procedures lead to unnecessary expense and often to misleading and unreliable information.

There has been considerable misunderstanding of what is meant by "noise exposure" and failure to realize when ear protective measures are indicated. Much of this misunderstanding can be overcome by proper educational campaigns and approaches which will help to reduce resistance to protective steps.—MEYER S. FOX, M.D., *2040 W. Wisconsin Avenue, Milwaukee, Wis.*

Legal Aspects of Noise Control

Granting workmen's compensation benefits in cases of occupational deafness for purely physiological or social loss where there is no loss or impairment of earning capacity has resulted in numerous complicated medicolegal and socioeconomic problems.

The new formula recently proposed by the Subcommittee on Noise of the American Academy of Ophthalmology and Otolaryngology does not make any provision for the nonmedical, legal, and economic factors which must be considered in the establishment of a "disability formula" as distinguished from an "impairment formula."

The medical and related sciences should yield basic data concerning the handicap or impairment caused by hearing loss. It would then become the function of the legislative or administrative authorities to determine at what point and to what extent the handicap becomes a compensable industrial liability within the meaning of the Workmen's Compensation Law. The data should include what is known about the extent of hearing losses among the general population caused by presbycusis, sociocusis, and nonoccupational disease so that in estimating the auditory effect of occupational noise exposure a uniform, corrective factor can be applied, on a statistical basis, to the audiogram to

cancel out the loss which may reasonably be assumed to have been caused by these other non-industrial elements.

Because of the difficulties of proof with respect to etiology and many uncertainties inherent in the problem, it would not be feasible or practical to handle this matter on an individual case basis. In cases of occupational loss of hearing, compensation should be paid only for the hearing impairment which is in excess of the degree of hearing impairment found in the average individual at different age levels among the general population not exposed to harmful industrial noise.

In any suitable disability formula, some recognition should also be given to the extent, if any, to which the employee's hearing impairment affects, or may in the future affect, his earning capacity.

Another question for which no satisfactory legal solution has been found to date is how to allocate compensable liability in the case of exposure to harmful noise in successive employments.—NOEL S. SYMONS, of the law firm *Vaughan, Brown, Kelly, Turner, and Symons, Buffalo, N.Y.*

Experimental Cancers Produced in Rats by Chromium Compounds

Numerous studies have failed to identify the agent responsible for the high incidence of cancers of the lung among chromate workers. A previous study provided highly suggestive evidence that the roasted chromite ore contains a carcinogenic agent. These and other observations indicated that the development of experimental tumors depended on the proper biological availability of chromium to the tissues, determined largely by the relative degree of solubility of the chromium compound present. The present study was undertaken to test the validity of this concept.

A series of chromium compounds covering a wide range of water solubility and including calcium chromate, sintered calcium chromate, sintered chromium trioxide (chromic chromate), barium chromate, strontium chromate, zinc chromate, and lead chromate were implanted surgically in the muscle tissue of the thighs and in the pleural cavities of Bethesda black rats. Each compound mixed with sheep fat was administered to 70 rats, 35 for each site.

Tumors produced in rats by chromium compounds

Compound and site of implant	Number rats living	Number rats dead	Number with tumors at site of implant	Percent of dead with tumors	Percent of tumors in total group	Observation period (months)
Calcium chromate (2,470):						
Pleural.....	0	35	21	60	60	18
Thigh.....	13	22	9	41	26	18
Sintered calcium chromate (1,280):						
Pleural.....	3	32	17	53	49	19
Thigh.....	7	28	9	32	26	19
Sintered chromium trioxide (1,710):						
Pleural.....	7	28	20	71	57	17
Thigh.....	4	31	21	68	60	17
Zinc chromate (610):						
Pleural.....	23	12	7	58	20	9
Thigh.....	26	9	9	100	26	9
Strontium chromate (230):						
Pleural.....	18	17	7	41	20	11
Thigh.....	21	14	8	57	23	11
Barium chromate (8.5):						
Pleural.....	16	19	1	5	3	17
Thigh.....	18	17	0	0	0	17
Lead chromate (<1):						
Pleural.....	34	1	0	0	0	9
Thigh.....	33	2	1	(50)	0	9
Sheep fat:						
Pleural.....	18	17	0	0	0	18
Thigh.....	16	19	0	0	0	18

NOTE: Figures in parentheses show the solubility in water of hexavalent chromium in milligrams per liter.

An equal number receiving sheep fat only were used for controls.

Five months after the material was implanted, the first tumors were observed in those rats receiving calcium chromate, sintered calcium chromate, sintered chromium trioxide, strontium chromate, and zinc chromate. Tumors occurred at the site of implantation in the thigh and in the pleural cavity (see table).

Animals receiving barium chromate and lead chromate developed tumors less frequently and after a longer latent period. The tumors were predominantly sarcomas and were highly invasive. A few intrathoracic cancers were pulmonary squamous cell carcinomas. In the pleural cavity, the tumors were usually adherent to the thoracic wall or diaphragm and frequently involved the lungs and other organs. In many of the animals part of the implanted material was observed embedded within the tumor.

These results, together with available epidemiological and clinical evidence, indicate that chromium is a carcinogenic agent if it is available to the tissue in proper dosage and form. Human lung cancer hazards may be associated, therefore, not only with the production of chromium chemicals and chromium pigments manufactured from chromite ore but also may occur with many other industrial and general uses of chromium metal and chromium compounds. Epidemiological studies on the frequency of lung cancers from such sources and in such industries and environmental conditions are lacking at present. The authors have compiled as a guide for epidemiological surveys a list of chromium products and operations and their industrial and environmental distribution.—W. C. HUEPPEL, M.D., AND WILLIAM W. PAYNE, *National Cancer Institute, Public Health Service.*

Relationship of Bladder Cancer to Metabolism of Aromatic Amines

Bladder cancer associated with such aromatic amines as 2-naphthylamine is believed to arise not from the original compound but rather from a biochemically changed product present in

urine. An understanding of the mechanism of carcinogenesis from such materials would help in devising protective measures and would aid in predicting the probable carcinogenic potential of analogous substances.

For these reasons a major search is on for the carcinogenic urinary metabolite. The remarkable species specificity of the disease has offered one approach to this problem. Only humans and dogs develop bladder cancer when exposed to carcinogenic amines; rabbits, rats, mice, and other animals tested are not sensitive. The most common compounds found in the urine of all species exposed to 2-naphthylamine are the sulfate and glucuronide conjugates of the O-hydroxyamines. We have recently observed two compounds only in human and dog urine, 2-amino-1-naphthol and bis-2-amino-1-naphthylphosphate; 2-amino-1-naphthol appears to arise from an unstable precursor in these urines. If this precursor is only the identified phosphate conjugate remains to be tested.

The occurrence of these unusual compounds only in the species which contract bladder cancer appears a promising clue in the mechanism of bladder cancer formation.—WALTER TROLL, PH.D., *Institute of Industrial Medicine, New York University, Bellevue Medical Center, New York City.*

Epidemiological Findings Associated With Beryllium Extraction

Approximately 100 case histories of patients with alleged beryllium disease have been analyzed by the physicians of the division of occupational health of the Pennsylvania Department of Health. These illnesses were diagnosed by the medical profession over the past 20 years from the approximately 4,000 persons employed in a beryllium extraction plant in Pennsylvania or living in its vicinity.

Sixty cases of chronic beryllium disease were studied following a thorough examination of hospital records, personal contacts with physicians, and interviews with the affected persons or their surviving relatives. These cases were divided into three groups: persons who con-

tracted the disease as beryllium plant employees; persons having contact with work clothes of plant employees; and persons living in the neighborhood of the plant.

Only histories of patients with known chronic illnesses were selected. Figures are not complete since new histories are being added because of the latent period, frequently long in duration, before beryllium disease becomes evident clinically.

A study of air pollution in the plant vicinity was conducted at the same time as the clinical examinations. It was found from routine autopsy that many lung specimens from residents of the plant vicinity contained detectable amounts of beryllium despite the fact that there was no evident beryllium disease.—JAN LIEBEN, M.D., M.P.H., AND FRANZ METZNER, M.D., M.P.H., *Pennsylvania Department of Health, Harrisburg.*

Diethylstilbestrol Effects on Workers

Since 1941, the absorption of diethylstilbestrol has been producing gynecomastia and other symptoms in chemical workers. A suggestion by Dr. K. C. Kohlstaedt led to the development of a bioassay method, modified from that of H. D. Lawson and associates, to measure urinary output of diethylstilbestrol in workers once a week for early detection of excessive absorption.

Ten immature female mice (CF-1 strain) weighing 8 to 10 grams receive 0.2 ml. untreated urine orally on 3 successive days. Two control series of 10 mice each receive 3 similar oral doses of diethylstilbestrol, standard solutions containing 0.06 and 0.18 micrograms per milliliter respectively. On the fourth day, all mice are killed with CHCl_3 , and the uteri are dissected and weighed in groups of 10 to ± 0.1 mg. Typical average uterine weights relate to dose of diethylstilbestrol as follows: zero dose, 8 mg.; 0.06 $\mu\text{g}/\text{ml.}$, 16 mg.; 0.18 $\mu\text{g}/\text{ml.}$, 31 mg.

Unexposed chemical workers excreted estrogens below the threshold of the test (0.02 $\mu\text{g.}$ per milliliter). Exposed and imperfectly protected workers showed values ranging from 0.06 to 0.55 ($\mu\text{g}/\text{ml.}$). Earliest symptoms of breast stimu-

lation were seen 1 to 2 weeks after urinary excretion reached or exceeded 0.1 $\mu\text{g}/\text{ml.}$

Elaborate precautions similar to those used in handling radionuclides were required to prevent absorption: isolation in a room with tiled walls, caps, dust masks, coveralls, rubber gloves, entrance and egress through a shower, daily change of clothing, special laundering methods, filtration of exhaust air, and scrupulous cleaning up of spills. Even with this care, certain workers had to be rotated off the job because of early signs of absorption.—R. M. WATROUS, M.D., AND R. T. OLSON, B.S., *Abbott Laboratories, North Chicago, Ill.*

Factory Heat Waves Can Be Broken

Heat relief measures for operating personnel have been undergoing drastic reevaluation and revision. As a result, surprising changes are at work in the design and equipment of new plant buildings. These changes are in a chronic race with the increase in heat production.

Each year more heat is released as equipment increases in size and number. Machine tools are more heavily motored; departments accommodate more machinery. The drive to raise productivity also promotes faster heating rates and greater tonnage output by furnaces in fields of annealing, heat treating, billet heating, and alloying. At the same time, building characteristics are changing in ways that hinder conventional ventilation practices. Long, narrow buildings that have aided cross-ventilation are disappearing and ventilation courtyards are being swallowed up. Furthermore, the vast expanses of glass sash wall construction pour solar heat into buildings; about 6 square feet of clear unshaded window glass can introduce as much heat into a building as a pound of steam.

Thus two opposing forces of industrial importance are meeting in head-on collision. Plant design trends stifle conventional ventilation methods at the same time that more heat release requires more and better ventilation. Indoor heat problems are being cleared up reasonably well by three simple procedures.

In the majority of cases, the cooling agent is air motion or circulation using air fresh from

outdoors. For these summer benefits, outdoor air can be taken in from levels slightly above the roof by a popular type of roof exhaust ventilator that is operated with reverse fan rotation to blow in large volumes of air at extremely economical cost. Locations can be selected to suit hot local area requirements. Refinements, where justified, can include air pattern distribution diffusers that are adjusted by a pull chain installed in the floor.

Severe heat cases involve operations such as molten metal, hot metal furnaces, kilns, and engines. The most severe cases usually involve the same plant operations as in heat shielding, but there is the added problem of high building ambient, or air, temperature. To overcome this combination, controlled air motion is supplied but can be doubled in effectiveness by use of water sprays for evaporative cooling. For scattered problem areas, individual so-called desert coolers serve.—BARTLETT R. SMALL, P.E., *Aluminum Company of America, Pittsburgh, Pa.*

Forecasting Air Pollution

On the premise that it might be practical to alert industrial plants against untimely discharges of wastes to the atmosphere, a procedure for forecasting meteorological conditions which are conducive to high pollution levels over a large area was tested during the fall of 1957 and 1958 by the Weather Bureau Research Station at Cincinnati, cooperating with the national air sampling network of the Public Health Service.

Tests of the alerting system were conducted from 33°N. to 43°N. and 78°W. to 88°W. Air quality measurements were taken on request by selected stations of the national air sampling network. A request was issued whenever the following meteorological phenomena occurred simultaneously and a forecast indicated they would persist for at least 36 hours:

1. Surface winds less than 8 knots.
2. Winds at no level below the 500 mb. pressure level to exceed 25 knots.
3. Subsidence below 600 mb.

During the fall of 1957 and 1958, six periods were observed in which the selected empirical

criteria were met. Air quality data were obtained for five of these periods.

Examination of the air quality data for the periods in which the weather was monitored revealed that the highest loadings, with few exceptions, occurred in those periods when the criteria were met. Although derived from limited data, the results indicate that macro-scale meteorological phenomena can be used to signify periods of high pollution potential for a large area. However, general application will require interpretation of pollution-potential forecasts in terms of anticipated concentrations of specific pollutants.—L. E. NIEMEYER, *Weather Bureau Airport Station, San Francisco, International Airport, San Francisco 28, Calif.*

Relationship of Street Level Carbon Monoxide Concentrations to Traffic Accidents

In Germany and the Scandinavian countries, investigators have reported extensive observations concerning carbon monoxide exposures insufficient to cause subjective symptoms but which affect the cardiovascular, endocrine, and respiratory systems, the blood, and the central nervous system, causing disturbances of vision, hearing, speech, and the reflexes.

Since a disturbance of vision and reflexes can be predisposing to traffic accidents, research was begun in 1956 to determine whether carbon monoxide as an atmospheric pollutant may be hazardous in urban areas.

To determine the CO in the atmosphere, three recording infrared CO analyzers were set up at various locations in Detroit. The full-scale reading of each instrument was 100 parts per million with reliable readings as low as 1 ppm. For a period of 27 weeks, a recorder was located on a depressed highway within the city. The data obtained at this station showed CO readings ranging from 0 to 100 ppm with a median of approximately 8 ppm. Another recorder was placed in a busy neighborhood shopping area for 58 weeks. The CO readings at this location ranged from 0 to 100 ppm with an approximate median of 10 ppm. For 21

weeks a recorder was operated in downtown Detroit and, here again, the CO concentrations ranged from 0 to 100 ppm with a median of approximately 9 ppm. The CO in the atmosphere of the residential area was sampled for 18 weeks. These readings ranged from 0 to 29 ppm with a median of only 2 ppm.

Data obtained from these infrared analyzers were tabulated first by quarter hour and then by hourly intervals, and then correlated with other factors, such as traffic count and meteorological conditions, which were also recorded on an hourly basis. From these data, we are attempting to predict the conditions which permit dangerous concentrations of carbon monoxide to be created in the atmosphere.

Another phase of the study included taking blood samples from drivers and pedestrians involved in automobile accidents to determine the percentage of CO saturation. A total of 227 blood samples have been analyzed and the results ranged from less than 0.5 to 31.5 percent saturation with an approximate median of 1.7 percent.—GEORGE D. CLAYTON, *George D. Clayton and Associates, Inc., Detroit*, WARREN A. COOK, *School of Public Health, University of Michigan, Ann Arbor*, AND W. G. FREDRICK, *Sc.D., Department of Health, Detroit*.

Air Pollution Inventory

In an effort to evaluate specific levels of emission of air pollutants characteristic of industries in Michigan, a door-to-door survey of industrial establishments was conducted in certain portions of Wayne, Macomb, and Oakland counties by the Michigan Department of Health in cooperation with the Public Health Service. The total emission, exclusive of combustion resulting from power generation and heating, amounted to 976 tons per day from an estimated 80 percent of the contributing establishments surveyed.

The study was concerned with the industrial process effluents, and accordingly, all types of manufacturing plants were included, with the exception of domestic and commercial establishments, transportation facilities, and power generation facilities.

Analysis of the data indicates that the steel

mills in the area account for more than half of the total pollution load, with automobile manufacturing, petroleum refining, inorganic chemical manufacture, gasoline and oil storage and handling, the manufacture of concrete and concrete products, and the manufacture of asphalt, all contributing lower but nevertheless large amounts of contaminants to the atmosphere.

The study obtained a complete inventory of air pollutants by industrial category, specific process giving rise to the pollution, composition of the pollutants, and the amount of material emitted. Industrial categories are tabulated and numbered in accordance with the new Standard Industrial Classification Manual (U.S. Bureau of the Budget, 1957).—BERNARD D. BLOOMFIELD, *Michigan Department of Health, Lansing*.

Five Years of Continuous Air Monitoring

Since May 1, 1954, outdoor air at roof level of a six-story building on the University of California campus has been monitored continuously for particulate material with the ACSI smoke sampler. The instrument filters twelve 2-hour samples per 24 hours (about 30 cubic feet per sample). The interpretation of darkening of the filter paper is based on photometric light transmission through the soiled paper and finally recorded as COH units per 1,000 linear feet of air through the filter.

On the average, the 5-year data show a consistent maximum of particulate pollution near midday on all days of the week. The average 24-hour pollution is lowest on Sundays, highest from Tuesday through Friday, and at an intermediate level for Saturday and Monday.

This difference is clearly demonstrated when the average data for these several days of the week is plotted on a log probability graph as suggested by analysis of results from the national air sampling network. Compilation of the filter-soiling data by this technique strongly indicates that the average information is internally consistent except at low COH readings.

Seasonally, the record shows relatively high pollution during the months of October

through January, relatively clean air from March through August, and intermediate results in the other months. When plotted by the log probability method, the seasonal data were not correlated so satisfactorily as were the annual data.

Since observations during the first 3 years were essentially similar both in annual average and in correlation by the log probability method, they have been used as a baseline for

comparison of subsequent annual trend. The fourth year showed significantly less pollution than the baseline years. An average decrease of 25 percent is attributed more to meteorology than to inauguration of the area's first air pollution control regulation. The fifth year of observation, starting May 1, 1958, showed a return of the average pollution toward that of the baseline years.—BERNARD D. TEBBENS, Sc.D., *University of California, Berkeley.*

Disability Days in the United States, 1957-58

As a result of illness and injury, workers with family incomes under \$2,000 per year lost an average of 10.3 days from work during the 12 months ending June 30, 1958, as compared with a loss of 5.9 days for those in families earning \$7,000 and over, according to the latest of a series of published statistical reports issued by the U.S. National Health Survey, Public Health Service. The data, applying to the total civilian population of the country, exclusive of persons confined to long-term institutions, are derived from continuing household interviewing with a representative sample of the population, conducted for the Service by the Bureau of the Census.

An inverse relationship existed also between income and other forms of restricted activity, such as days in bed due to illness and injury.

Workers 65 years of age and over lost about 11 days from work compared with 8.4 days for those in the group 45-64 years and 6.3 days for those aged 17-44. City children lost

9 days from school, on the average, as a result of illness and injury; rural nonfarm children lost 7.8 days; and farm children lost 7.3 days. However, farm children 15 and 16 years of age lost about 10 days from school as compared with 6.5 days lost by urban children of these ages.

Respiratory illnesses as a group were responsible for 40 percent of all activity restriction and half of all days in bed. Circulatory diseases ranked second in terms of total volume of disability, followed by injuries and their chronic effects and then digestive diseases.

The publication contains additional data on the relation between disability and various characteristics of the population, giving details by calendar quarter. Copies of the report, "Disability Days, United States, July 1957-June 1958," PHS Publication No. 584-B10, may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., at 40 cents a copy.

By reviewing the historical background of hospital regionalization, researchers are aided in applying the techniques of industrial engineering to the problem of improving the efficiency and economy of hospital services in geographic regions.

Hospital Regionalization in Perspective

MILTON I. ROEMER, M.D., and ROBERT C. MORRIS, M.S.

REGIONALIZATION of hospital services has become a popular theme in the United States. Since 1947, State master plans for hospital construction under the Federal Hill-Burton Act have been based on this concept. Regional and metropolitan hospital councils are set up in 11 States. Insurance commissioners, faced with rising Blue Cross premiums, have called for regional coordination of hospitals to reduce costs (1). A series of conferences has been held across the Nation on planning hospital systems, in which regional organization is the key problem. Seasoned hospital leaders call for more research in the field (2).

But the meaning of "hospital regionalization" is not always clear. To some it is simply an approach to making decisions on where hospital buildings are needed and how many beds should be provided at each location. To others it means a systematic scheme for cooperation among hospitals in their day-to-day operations. To a European, it usually implies unified management of a network of hospitals

in a geographic region. And there are other defined points in the range of possible meanings.

In fact, hospital regionalization has had different meanings historically, and it has different meanings today in different parts of the world or different places in the United States. Perhaps the only common note in all the interpretations is an element of coordination, in planning construction or in actual operations or both, among a group of hospitals in a geographic region. Ways of expressing this coordination vary greatly. The intention is always to give the hospital program a rational structure in order to improve the quality of service or reduce the costs or both. But whether this goal has actually been achieved by regionalization efforts or how it might be best achieved are large questions to which we do not have answers.

If we take a closer look at the hospital regionalization movement, we may gain perspective in designing research to answer these questions.

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Historical Background

It is customary in the United States to trace the origin of the hospital regionalization idea to the program of the Bingham Associates Fund operating in Maine since 1936 (3). Here was an effort to bring first-class modern scien-

tific medicine to residents of the rural areas and small towns of Maine. The emphasis was on improved resources for medical diagnosis. The base center is in Boston, where difficult cases are sent. Then there are two regional or district hospitals in the principal cities of Maine and 38 cooperating small community hospitals around them. More recently western Massachusetts has been added to the program. In this area four larger hospitals, lying close together, jointly serve as a regional center for 10 smaller community hospitals. Laboratory specimens and X-ray films are sent from the community hospitals to the regional centers for examination, and consultants go outward from the centers to advise the rural doctors. Physicians are encouraged to come to the centers for postgraduate education. Consultation is also offered in nursing, dietetics, medical record-keeping, and other aspects of hospital administration.

This program, with its two-way flow of patients and services, now the hallmark of the regionalization concept, was built with outside philanthropic support. Certainly the quality of services in the smaller hospitals has been improved, but we have little, if any, idea of the relative costs and whether the same end might be served in other less expensive or more effective ways.

The basic idea of hospital regionalization, however, is much older than the Bingham program. In Denmark, around 1912, the decision was made to avoid further building of rural hospitals and to bring patients with complicated illnesses from rural areas to the central hospitals. A network of institutions was developed, centering in Copenhagen and branching out to the whole country (4).

In 1920, there appeared an English study on improving hospital services which described the basic scheme embodied in the British National Health Service 28 years later. The Dawson report called for establishment of a network of hospitals within which all services could be integrated. It defined primary and secondary health centers and recommended that the smaller units, staffed mainly by general practitioners, be supervised by the larger ones, staffed mainly by specialists. The report even sketched prototype centers, showing buildings

and layouts and listing services to be performed (5).

Military medical establishments have long been organized on a regional scheme, with base hospitals, division or theater-of-operation hospitals, and field stations. Highly systematized, of course, these hospitals demonstrate the feasibility of actual administration of many institutions by a central authority.

Colonial governments have likewise operated hospital systems through central authority. In Asia and Africa, there are capital and district hospitals, with small health centers or mobile clinics at the periphery. Countries liberated from colonial domination, such as India or Indonesia, have usually retained and developed these regional hospital networks.

With one or two exceptions, Catholic sisterhoods do not operate regional hospital networks, but they have long exercised central authority over certain aspects of their hospitals which may be located in scores of far-flung communities. Funds are pooled which may be channeled to provide construction and equipment wherever it is most needed, and uniform administrative policies are usually enforced.

These are expressions of the hospital regionalization concept originating many years ago. In fact, if we think of regionalization as a range of activities, we must go back even further. For any step of a hospital from isolation and self-sufficiency toward interdependence with other agencies or organizations is fundamentally a move in the direction of regionalization.

Thus we can visualize a hospital in colonial America, such as the Pennsylvania Hospital in 1751, as an institution quite alone. The staff may not have grown their own food for hospital use, but surely they made most of their own bandages and supplies. There was, moreover, little to be purchased from the commercial market. There were ideas brought from Europe, but their implementation was entirely up to the small staff working in this solitary structure.

As other hospitals were established, as industry grew, as medicine developed, the hospital obviously became less isolated. Equipment and supplies were produced by industrial companies. Educational institutions trained skilled personnel needed to staff the hospital.

A public health laboratory did tests on hospital patients. A State agency was given legal authority to approve certain aspects of hospital construction or operation. Money to support services for certain beneficiaries was derived from diverse public and voluntary agencies. Associations of hospitals were formed for educational and promotional purposes.

In different countries, this process of dynamic inter-relationship among hospitals has evolved in different ways and to varying degrees. In general, the process has gone further in countries where governments at all levels, national, provincial, or local, have become largely responsible for the ownership and operation of hospitals. This is, indeed, the predominant pattern in Europe, Latin America, Asia, and in fact the entire world outside the United States and Canada (6).

Even in the United States, however, the regionalization process has been clear and gaining momentum. Much of it has been on a casual, spontaneous basis. Patients are transferred from one hospital to another. Equipment is sometimes lent. A radiologist based in one hospital interprets films sent by another. A blood bank in one hospital sends a pint of blood to another.

Other expressions of the process toward integration and coordination of hospitals have been more formal and systematic. The Bingham program has been mentioned, and it is historically important not only for the specific mechanisms it pioneered but also for the attention it focused on the need for improved medical care in rural areas.

As America has become industrialized and urbanized, the rural areas have, in a sense, been left behind. The same is true all over the world. A special consciousness of the problems of rural medical care emerged in the 1930's. The first conference on rural medicine was held at Cooperstown, N.Y., in 1938. The Bingham program in Maine got started. The Commonwealth Fund launched its program of building rural hospitals and supporting medical education for rural youth. Improved public health organization in rural counties was promoted. The U.S. Department of Agriculture started its medical care program for low-income farmers (7).

It was during World War II that the regionalization idea matured as an approach to improved hospital service for rural people. Public understanding grew and plans were made for a federally subsidized construction program. In 1945 the Commonwealth Fund promoted the Council of Rochester Regional Hospitals (8). Immediately after the war, in 1946, the National Hospital Survey and Construction Act was passed, providing not only funds to subsidize hospital construction but requiring a master plan to be drawn up by each State establishing priorities for different localities. Virtually everywhere the rural areas received top priorities because their relative bed shortages were greatest (9).

Under the impetus of the Hill-Burton Act, planning groups studied bed needs in all the States. A formula calling for 4.5 to 5.5 general hospital beds per 1,000 population in a State made planning for construction purposes relatively easy. Planning for coordinated hospital operation, however, was not so easy. Attractive charts portrayed networks of regional, district, and community hospitals in each State, implying the classic two-way flow of patients and services. In practice, the State hospital construction agencies were seldom in a position to bring life to the charts in day-to-day hospital operation.

Coordinated Operations

Nevertheless, the introduction of rationalism into construction planning stimulated voluntary groups to do something about coordinating hospital operations.

National attention was focused on the regionalization experiment around Rochester. Elsewhere in New York State regional hospital councils were organized, not simply to process applications for construction funds but to promote interhospital cooperation (10).

State hospital associations became organized or revitalized. They conducted educational and informational programs for their members. Training institutes were held for hospital trustees and administrators as well as for nurses, dietitians, medical record librarians, laboratory technicians, and business office personnel. Uniformity was introduced into ac-

counting practices so that hospitals could deal effectively with third-party payers, such as governmental welfare agencies or Blue Cross hospital insurance plans.

The hospitalization insurance movement did a great deal to bring autonomous hospital administrations together. Through boards of directors of regional Blue Cross plans, hospital advisory committees, and other mechanisms, administrators discussed common problems of hospital operation. Many of these problems are expressed ultimately in per diem costs which the prepayment plan is expected to meet. To sell Blue Cross insurance policies, premiums must be kept as low as possible, and yet premiums are based on hospital operating costs. While costs have indeed been rising, in line with the continued improvement in the content and quality of hospital service, the Blue Cross program in recent years has exerted moderate pressure toward economy and efficiency in hospital operation.

It is true that some observers doubt if paying agencies are doing enough to induce economical operation of hospitals. It is even claimed that prepayment has led to extravagance. The challenge of the State insurance commissioners has been mentioned. Representatives of organized workers, who make up a large proportion of the Blue Cross membership, have been skeptical of the efficiency of hospital administration. In any case, public pressure created by a vast extension of prepayment for hospital care is doing much to bring hospitals together to explore common problems of effective administration.

One expression of this is the organization of joint purchasing arrangements. While the development is still modest, in some large cities hospitals have agreed on standard specifications for linens, laundry supplies, antiseptics, certain drugs, and the like, and have achieved lower prices through mass purchasing. The Hospital Bureau of Standards and Supplies, Inc., is a national organization devoted to this purpose. A nonprofit organization, it purchases many commodities for its hundreds of members, does product testing, and issues informational bulletins. Similar group purchasing activities are conducted by the hospital councils in Rochester, N.Y., and Harrisburg,

Pa., by the Federation of Jewish Philanthropies of New York City, and by others. The purchases made in this way, however, usually constitute only a small percentage of the total made by the cooperating hospitals (11).

Another measure of cooperation is the pooling of resources for educating nurses. Certain types of didactic instruction are given to the student nurses of one hospital in the training school of another. Students from many general hospital schools of nursing may receive practical training in mental disease, pediatrics, or obstetrics in "affiliated" hospitals specializing in these fields. In Saskatchewan, Canada, in Massachusetts, and elsewhere, centralized lectures for students from many nursing schools have been given in universities.

Medical schools have taken the initiative in a number of places to promote postgraduate education of physicians through the local hospitals in a region. Programs around the medical schools at Buffalo, Richmond, New Orleans, and Berkeley have been outstanding. Rotation of interns and medical residents from a university hospital among several surrounding community hospitals is a growing practice which helps elevate the quality of service in the smaller institution while it gives the young physician insight and experience in a simple grassroots setting (12).

Regional and metropolitan hospital councils with full-time staffs in the United States have increased from the first one at Rochester, N.Y., in 1945 to 23 in 1958 (13). Their functions vary greatly, but they all represent a pooling of interests by several institutions to achieve improvement in hospital service. The majority of the councils have been organized in large metropolitan cities, where a dozen or more hospitals are found. Their scope of activity changes from year to year, but there has been a clear tendency to progress from an original primary concern with construction planning to the wider problems of the content of hospital service.

Even so, hospital council activities are still oriented more to administrative problems than to elements of direct patient care (14). Programs depend on council members and their needs of the moment. While the Syracuse council, for example, regularly summarizes

vital statistics for hospitals of the region, it also does many one-time jobs, such as preparing a booklet to recruit young people for work in the hospital field. The Buffalo council supplies a clearinghouse for employment. The Philadelphia council does much to encourage uniform accounting procedures. The Harrisburg council is now deeply involved with reorganizing activity to comply with the Pennsylvania Insurance Commissioner's ruling of 1958 (1). The Chicago council is making arrangements with the telephone company and the many local fire and police departments for coordinated hospital action in the event of disaster. The Swift Current council in Saskatchewan provides consultant services in X-ray technology, pharmacy, dietetics, and accounting to its member hospitals (15).

Thus, hospital councils are in a stage of vigorous growth. Aside from their basic services, they are laying the groundwork for greater cooperation among sovereign hospitals in the future.

Evolution of interhospital cooperation to the point of unified management of several institutions has occurred only in a handful of places in the United States. Federal hospital systems for veterans, Indians, merchant marines, and similar groups under the Veterans Administration, Public Health Service, and other agencies, are, of course, highly rational. These programs, however, started out on a centrally organized basis under uniform rules and regulations. They do not include community hospitals open to all persons.

The closest thing to regional management of a network of community hospitals is seen in the Miners Memorial Hospital Association of the United Mine Workers of America. Supported by the welfare and retirement fund of this union of coal miners, the association operates 10 hospitals in the Appalachian Mountain States. There are regional and peripheral hospitals in the system. Authority is centralized with a branching-out of delegated responsibilities. Functions involving direct patient care are, of course, locally based, while supportive activities, such as accounting and payroll, specialized plant maintenance, purchasing, and staff hiring are done regionally for the entire group. Financial functions are centralized to

an even further degree; they are performed with electronic equipment at the United Mine Workers headquarters in Washington, D.C. (16).

In the Adirondack section of New York, there is a group of three small hospitals, set up by the Noble Foundation, under single management. Some church missions operate a network of small hospitals in the southwestern United States. In western Pennsylvania, the hospital division of Grenoble Hotels, Inc., is a private organization engaged in the business management of 11 general hospitals under voluntary auspices. Five independent hospitals in Newark, N.J., have just consolidated their administration as the United Hospital Association.

The Commonwealth of Puerto Rico, with the support of the Rockefeller Foundation and the Public Health Service, is developing a regional hospital system under central direction. A large regional center, 3 district hospitals, and about 14 small community hospitals are in the network. Not only is the management of all these hospitals unified, but even medical services throughout the region are supplied or directed by a staff of qualified specialists located at the regional center (17).

Discussion

This, then, is a brief review of where we stand in the United States in the broad range of hospital regionalization activities. A great deal is going on and established ideas of hospital services are obviously in ferment. Yet the surface of the possibilities of regionalized hospital services through teamwork in natural trading regions has hardly been scratched.

The chief determinants of the degree of interhospital cooperation are philosophical and technical. The philosophical or ideological determinants are found, of course, in our whole system of free enterprise in health service. They include the existence of two types of sovereignty: the autonomy of the boards of directors of voluntary hospitals and the independence of the practicing physicians who staff the hospitals.

We have seen how small bits of these sovereignties have been yielded through increased

cooperative activities among hospitals. Professional independence also has been modified by the widening group discipline within the medical staff organization in hospitals. Appointment of full-time chiefs of clinical services, centralized medical audit procedures, diligent tissue committees, and limitations of privileges have all helped to introduce a collective conscience into the practice of medicine in hospitals.

These two levels of sovereignty are central features of American health service, and they will doubtless be part of our life for a long time. Yet we are finding that cooperation and teamwork among hospitals does not reduce the dignity of the individual patient, doctor, board member, or administrator.

It is, however, the second determinant of any interhospital cooperation, the technical aspects, that will ultimately be most decisive. How much is really to be gained in effective hospital service by more highly organized relationships among institutions in a region? How much can the quality of care be improved by joint action and how much can costs be reduced?

To answer these large questions, they must be broken into many smaller parts. There are perhaps 15 to 20 principal activities involved in hospital service: nursing care, laboratory service, dietetics, business management, and plant maintenance, to name only a few. Under each of these are dozens or even hundreds of subdivisions. The activities in a laboratory service, for example, include the establishment and maintenance of equipment, the supervision and judgment exercised by a pathologist or laboratory director, the training of technicians of many types, the procedures for doing hundreds of tests, the review of technical performance to assure accuracy, the issuance of reports, and the like. Certain laboratory examinations, moreover, are very complex and can be done only in highly technical centers, while others are simple and can be done in the most modest setup.

If the advantages of regional cooperation are to be evaluated, each of these many units of hospital service must be considered objectively. Measurements must be made in which cost is one dimension and patient need another. Under the latter, one must consider the frequency of

need for a specific service and the importance of time. A corollary of time is distance and the feasibility of transportation.

These questions are familiar in other contexts, especially in the organization of industry. They are the bread-and-butter problems of students of production and industrial engineering. Are there secrets in American technology which have not been applied to the production and distribution of health services?

There is need to take a closer look at the organization of hospital services in geographic regions from the viewpoint of technical effectiveness. One must not overlook the patient, because his welfare must always remain in the center of the picture. One must likewise not lose sight of ideological realities in American culture. But research focused on the technical aspects of hospital regionalization is urgently needed to evaluate properly the advantages to be gained through cooperative efforts.

If clear-cut technical advantages to specific forms of teamwork among hospitals can be shown, half the battle will be won. To the extent that gains are demonstrable, the American mind usually finds ways of application. If more highly developed expressions of hospital regionalization can be shown to yield better hospital services at the same or lower costs than prevail in the United States today, we are bound to find ways of implementing these approaches which will be philosophically acceptable and consistent with our social values.

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 - (16) Miners Memorial Hospital Association: [A series of three articles.] United Mine Workers' hospitals—part 1. Hospital chain [parts 2 and 3]. *Architectural Forum* 99: 132, August; 99: 150, September; 99: 132, November 1953.
 - (17) Ferrer, R. A.: Annual report for fiscal year 1957-58 of the Project for the Regionalization of Health and Welfare Services of the Bayamon Area. San Juan, P.R., Department of Health, Regional Office for Coordination and Research, August 29, 1958.

Career Opportunities

Columbia University School of Public Health and Administrative Medicine has announced an institute on new developments in psychiatry to be held November 18-19 in Syracuse, December 2-3 in Albany, and December 16-17 in New York City this year. Enrollment is open to personnel in national, State, and local health departments, in voluntary health agencies, and in family service organizations. Information may be obtained by writing to Program of Continuation Education in Public Health, 600 West 168th Street, New York 32, N.Y.

The University of Michigan and the University of Minnesota Schools of Public Health will hold an institute on prevention and management of handicapping conditions in infancy and childhood. November 16-20, 1959, in Ann Arbor, Mich., sponsored by Michigan

and Minnesota State maternal and child health and crippled children's programs under a grant from the U.S. Children's Bureau. Seminars and discussions on extent and distribution, pathogenesis, prevention, recent advances in management, and program planning and evaluation are a part of the program. Eligibility is limited to staff members in States in Regions V and VI of the U.S. Department of Health, Education, and Welfare. Further information may be obtained from Dr. Donald C. Smith, associate professor of maternal and child health, University of Michigan School of Public Health, Ann Arbor, Mich., for Region V, and Dr. Helen M. Wallace, professor of maternal and child health, University of Minnesota School of Public Health, Minneapolis, Minn., for Region VI.

Meals-on-Wheels Projects

MEALS-ON-WHEELS, a practical answer to the problem of feeding care for the aged and handicapped, has been adopted as a health service by a number of communities. These projects recognize that malnutrition is one of the chief causes of illness in the elderly person. Improvement in diet often results in recovery from physical disability.

The meals-on-wheels project in Columbus, Ohio, began in 1956 with voluntary contributions collected by the Columbus Federation of Women's Clubs. At that time, an estimated 400 persons in the city more than 65 years of age could not prepare nourishing meals for themselves.

So that no one would be denied the service because of inability to pay the entire cost, a sliding scale based on income was applied to determine the amount to be paid by the client.

Three plans were used to determine what recipients were to pay for the service. In plan A, public assistance recipients pay up to 80 cents daily, and other needy persons pay some portion of the cost. Under plan B, nonindigent, elderly, or handicapped recipients pay \$2 daily. In plan C, hospital patients returning to their homes who need the service temporarily until recovery pay \$2 daily unless they qualify under plan A.

The menu was planned by a member of the Columbus Dietetic Association. The meals, prepared and packaged by a quality restaurant, consist of a dinner of meat, fish, or poultry, a vegetable, salad, bread, butter, dessert, and milk; a supper of a sandwich, milk, and fruit; and a snack of fruit or juices with a sweet roll or ready-to-eat cereal. Weekday deliveries are made by four taxicabs with separate routes.

From April 1957 to January 1958, 742 meals under the payment plan of \$2 per day, and 1,922 meals under the payment plan of 80 cents per day were served to recipients.

Hospital patients were referred 1 day or more in advance by the physician or social service of

the hospital. The recipients ranged from 45 to 94 years of age; 15 were over 70 years of age; and 9 were over 80.

Most of the recipients were receiving regular medical attention. Four persons were receiving regular services of a visiting nurse. Most lived alone in a single room. While a few had adequate cooking facilities, they lacked the physical ability to use them.

The staff donating voluntary services was composed of a full-time director; a bookkeeper (half day a week); three investigators, a collector, and two nutritionists (4 hours a week each); four drivers for Sunday and holiday delivery and two casework supervisors (3 hours a week each); and 12 committee workers for publicity (2 days a month).

The meals-on-wheels project in Rochester, N.Y., providing food for "shut-ins" over 45 years of age has been in operation for more than a year.

The project, begun April 16, 1958, is administered by the Visiting Nurse Service of Rochester and Monroe County on a contract basis for the bureau of chronic diseases and geriatrics of the New York State Department of Health. It is a 3-year pilot study of one type of community health service, domiciliary feeding of the aged, to enable them to live independently.

At the end of the project, a manual based on the study will be prepared to assist other communities in setting up similar projects. Part of the pilot plan is the evaluation of the service with respect to nutrition, cost of operation, administration, medical problems, satisfaction of community needs, and technical aspects of preparation, packaging, and delivery of food.

Within an hour at midday, 5 days a week, 5 private automobiles, each manned by 2 volunteers, deliver and serve food for 2 meals to approximately 8 to 10 clients, a total of 40-50 persons served daily. The meals, a hot dinner and a cold high-protein sandwich supper, are

prepared and packaged at the specially equipped kitchen which VNS added to its headquarters in the heart of Rochester. Menus are planned by the staff nutritionist of the Visiting Nurse Service, and special diets, such as low-sodium and diabetic, are provided on physicians' orders.

The charges range from 50 cents to \$1.25 per day, with the "adjusted fee" scaled to income. Charges are payable in advance by the month on a signed agreement basis between the client and the association. It is a business-like, dignified arrangement, and appears to be acceptable to the clients.

The maximum number that can be served at the present time with the association's staff, equipment, and geographic and traffic limitations is about 50 persons. The project is generally working at capacity, although the number of clients varies. Because of basic requirements and effective screening prior to service by the public health nurse, the large

number of applicants thins out to a small number of eligibles. The association has been able to care for all who are approved.

The first annual report shows that the clients numbered 143 and ranged in age from 45 to 96 years, with an average age of 76.5 years. There were $2\frac{1}{2}$ times more women than men. Ten couples were served.

The number of days' service per client ranged from 1 to 253 days; the average was 58.2. All paid something more than 70 percent of the full fee. There were 91 regular diets and 52 special, on doctors' written prescriptions. Medical care was provided by private physicians to 115 of the 143. Relatives referred about 28 percent; the rest were referred by physicians, hospitals, social agencies, or the clients themselves.

The Rochester Visiting Nurse Service has played host to many visitors and observers, including public health workers attending a New York State health conference.

Diabetes Casefinding in the Virgin Islands

A diabetes casefinding campaign, combined with venereal disease testing, was conducted in the Virgin Islands in the spring of 1959 by the Islands' department of health assisted by the Public Health Service. Lasting from March through June, the islandwide screening program offered diabetes blood tests to an estimated 10,000 to 15,000 out of the total population of 24,000.

This was the first time mass screening for diabetes was done in the Islands of St. Croix, St. John, and St. Thomas. Besides discovering hitherto unknown diabetics and bringing them to treatment, the campaign will supply data on the prevalence of the disease in the Islands. These data are currently being processed.

Blood tests were offered all persons over 15 years of age, but special appeals were

made to persons most likely to have diabetes, such as relatives of diabetics, parents of babies of large birth weight, the obese, and adults over 40 years old. Public cooperation was stimulated by newspaper stories, flyers, radio broadcasts, and, via sound trucks, talks on the disease and its disabling effects if untreated.

Screening was carried out at fairs and other public gathering places. Industrial workers were tested during working hours and health department workers made door-to-door home visits to accommodate those desiring the test. The Hewson Clinitron, designed to perform the Wilkerson-Heftmann blood sugar screening test, was used in the program. At capacity the machine can complete 120 tests per hour.

Asian Influenza in High School Students

KENNETH D. ROGERS, M.D., and HORACE M. GEZON, M.D.

IN THE FALL of 1957 throughout Allegheny County, Pa., there was a sudden rise in the prevalence of acute respiratory infections accompanied by systemic symptoms and signs. Because of the forewarning that the Asian variant of influenza type A was likely to become epidemic and because the symptomatology of the prevailing illness was consistent with that of influenza, many of the cases were diagnosed clinically as Asian influenza.

However, as in any epidemic the question arose as to whether all of the acute illnesses had a common etiology or whether several types of illness were concurrent. In this particular epidemic, it was of interest to know which children had not been infected so that susceptibles could be immunized when supplies of vaccine became available. Information concerning attack rate in this population was also desired for estimating the likelihood of a second epidemic later in the year.

During the epidemic there was a high rate of absenteeism in the high schools of the county. A large number of students in several high schools answered a questionnaire concerning characteristics of any illness they had experienced during this period, and many of these students were studied serologically for the pres-

ence of specific antibody against the Asian variant of influenza type A. During the same time period, virus isolations were made in the Allegheny County Health Department laboratory from throat washings and autopsy specimens obtained from patients with acute respiratory disease. Finally, in an attempt to determine if the disease spectrum observed during the epidemic was unique, a repeat questionnaire survey of illness was made in one high school in the fall of 1958.

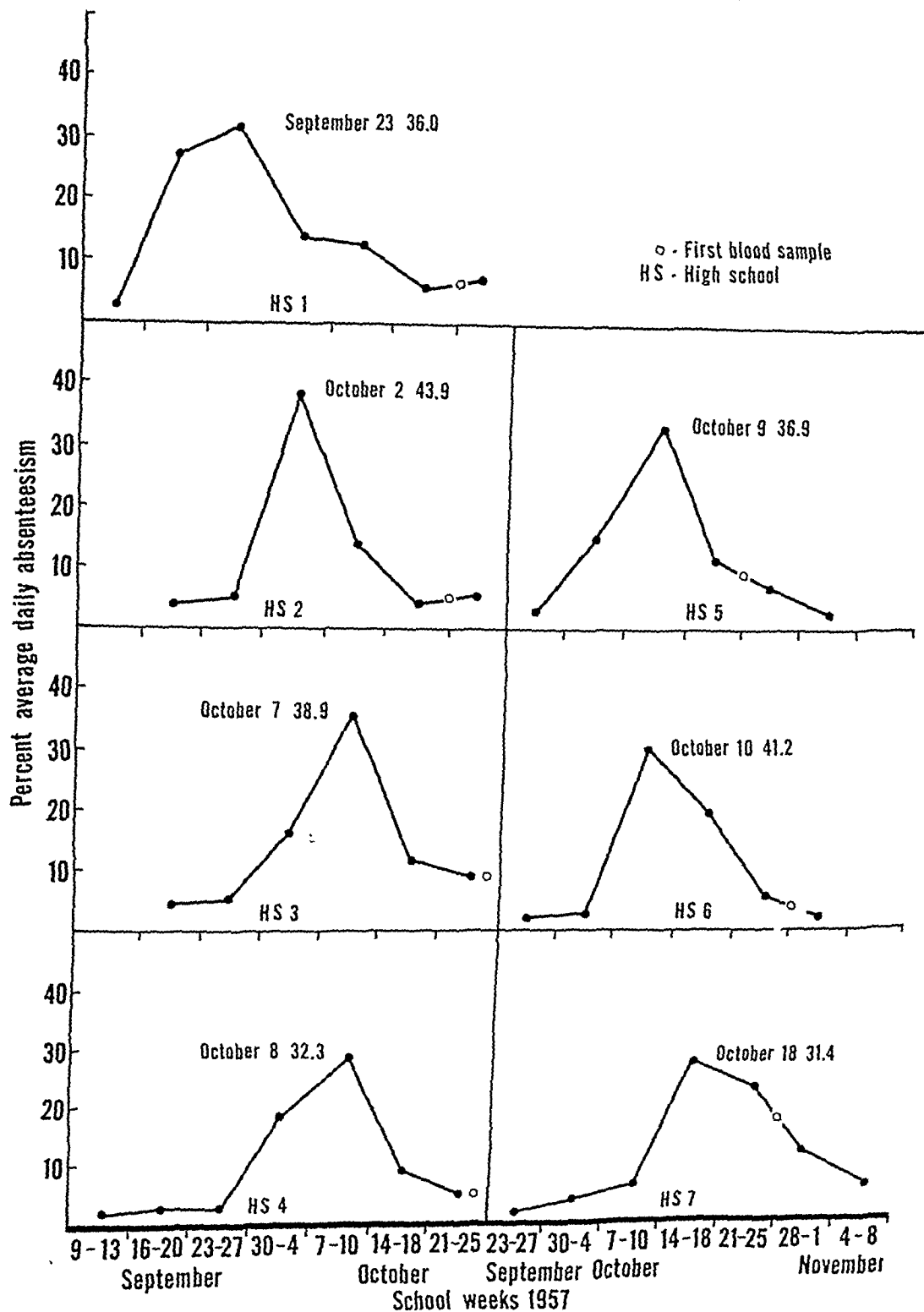
Blood Samples and Illness History

A total of 953 students in seven high schools distributed over the five county health districts were studied. In six of the schools samples were small in number and not selected in such a way as to make them representative of the whole school populations from which they were taken. In the remaining one, Dormont High School, the entire enrollment of 679 students answered questions concerning illness, and 429, or 63 percent, contributed blood samples. Therefore, most of the observations in this study were made on the Dormont school population.

From 10 to 31 days following the peak of absenteeism in each school, student volunteers gave blood samples and, at the same time, answered a simple questionnaire about incidence, duration, and symptomatology of any illnesses experienced in the preceding 30 days. Symptomatology was reported by both the student's written description of illness and a simple checklist of signs and symptoms likely to be present in illnesses of the gastrointestinal, respiratory, or central nervous systems. One year after the first illness history was obtained, the Dormont students were questioned concern-

Dr. Rogers is associate professor of maternal and child health, and Dr. Gezon, professor of epidemiology and microbiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pa. The study, partially financed by grants from the Pennsylvania Department of Health and the Children's Bureau, Department of Health, Education, and Welfare, was carried out with the cooperation of the Allegheny County Health Department.

Figure 1. Average daily absenteeism by percentage of enrollment in selected high schools, Allegheny County, Pa., September–November 1957



ing illness during the preceding nonepidemic month, September 24–October 24, 1958.

Fourteen to 24 days after the initial blood samples were obtained, additional samples were given by part of the original group. Dormont students who gave blood specimens a second time were chosen in approximately equal numbers according to the time and type of their experience during the epidemic period—not ill, ill and absent at the beginning of the period, ill and absent toward the end of the period, and ill but not absent. Second specimens were obtained from volunteers in other high schools without reference to their previous history.

Laboratory Materials and Methods

Serums. The serum was separated from whole blood on the day the specimen was obtained and stored in rubber-stoppered glass tubes at -10°C . The serum was thawed, diluted 1:20, and inactivated at 56°C . for 30 minutes just prior to testing. Paired serum specimens were tested at the same time. Single serum specimens were tested in large groups with appropriate positive and negative serum controls.

Complement fixation (CF) test. A modification of the standard Kolmer technique was used to detect antibodies against virus of Asian variant influenza type A. The antigen was prepared from pooled chorioallantoic (CA) and amniotic (A) fluid of infected embryonated eggs. Influenza virus A/Asian/Japan/305/57 which had been passaged four times in eggs, once in ferrets, three times in mice, and eight times in eggs was furnished by Dr. Keith E. Jensen. Ten- to 11-day embryonated eggs were inoculated amniotically, harvested after 48 hours incubation at 37°C ., and the CA and A fluids tested separately for hemagglutination using human type O cells. Fluids with a titer of 1:64 or greater were pooled, inactivated at 65°C . for 1 hour, and used as the antigen. Two units of antigen, as determined by titration against positive human serum, were employed. Twofold serial dilutions of serum from 1:20 to 1:320 were tested.

The final test contained 0.2 ml. serum, 0.2 ml. antigen, and 0.2 ml. of guinea pig complement containing two exact units. The tubes were incubated at 37°C . for 75 minutes, and imme-

diately afterwards 0.4 ml. of 2 percent sheep red blood cells sensitized with two units of rabbit hemolysin was added. The results were read after incubation for 20 minutes at 37°C . Comparative studies with incubation at 37°C . for 20 minutes and at 4°C . for 18 hours showed greater specificity with the former but greater sensitivity with the latter.

Virus isolations. Specimens were stored in sealed ampules at -70°C . until tested. Lung tissues were ground with sterile alundum and prepared as a 10 percent suspension in nutrient broth containing 250 $\mu\text{g./ml}$. penicillin and 250 $\mu\text{g./ml}$. streptomycin. Nose and throat swabs in tryptose phosphate broth (Difco) were first plated on sheep's blood agar. Penicillin and streptomycin were then added and the broth inoculated amniotically into five 10- to 11-day embryonated eggs. Eggs were harvested after 48 hours incubation at 37°C . and CA and A fluids tested for hemagglutination. Specimens giving a negative reaction were passaged again in eggs and those giving positive reactions identified with the antisera to the influenza strains, A/Denver/1/57, B/GL/1739/54, and A/Asian/Japan/305/57.

Pattern of Spread

In six of the seven schools children answered questions regarding the presence and characteristics of illnesses occurring in the preceding month. Although there was a variation in the several schools, the relative order of frequency of various signs and symptoms was similar. For example, fever, headache, and sore throat were commonly reported, while diarrhea was infrequently reported. Because of the common clinical characteristics, it was considered likely that the same epidemic disease was present in the various schools.

The pattern of absenteeism in the seven high schools was also similar. All showed an abrupt rise in absence rates reaching a peak of 30 to 40 percent of the enrollment within 7 to 10 days and returning to near normal levels by the third week of the epidemic. Schools 3, 4, 5, and 6, which were in widely separated parts of the county, had the time of maximum absence October 7 to 10 (fig. 1). The peak absence dates for the other three schools preceded or followed this period by 1 or 2 weeks.

The pattern of spread within Dormont (HS 4) was examined in detail. It was assumed that students within a given grade were more intimately in contact with one another and that if the epidemic within the school had started first in a small group, such a pattern of spread might be detected by studying absence by grade and time. The daily incidence rate of absence by grade during the period of the epidemic showed no evidence of differences in time, except possibly in the more explosive development of disease in the ninth grade (fig. 2).

Severity of Illness

In Dormont High School, severity of illness in children of different ages was estimated from the relationship between absence and illness. Illness which was accompanied by absence from school was assumed to indicate greater severity than illness without absence. The students, by grades, were classified into three categories according to illness-absence experience during the period September 24 to October 24,

1957. The pattern was similar in all four grades.

Grade	Ill and absent (percent)	Ill, not absent (percent)	Neither ill nor absent (percent)
9-----	72	10	17
10-----	75	7	19
11-----	76	8	14
12-----	72	11	17
All students-----	74	8	18

Illness Characteristics by Time Periods

To determine if the illness exhibited by Dormont students changed in characteristics during the period of greatest absence frequency, students who volunteered to give blood specimens were divided into three subgroups according to the week in which their first day of absence occurred. The frequency of symptoms and signs reported was similar for the three groups although it tended to be lower in the last time period (table 1). The duration of individual absence was similar for the first two periods but tended to be shorter in the last. Since data were collected the day following

Figure 2. Daily incidence rate of absence by week in students by grade, Dormont High School, September–October 1957 and 1958

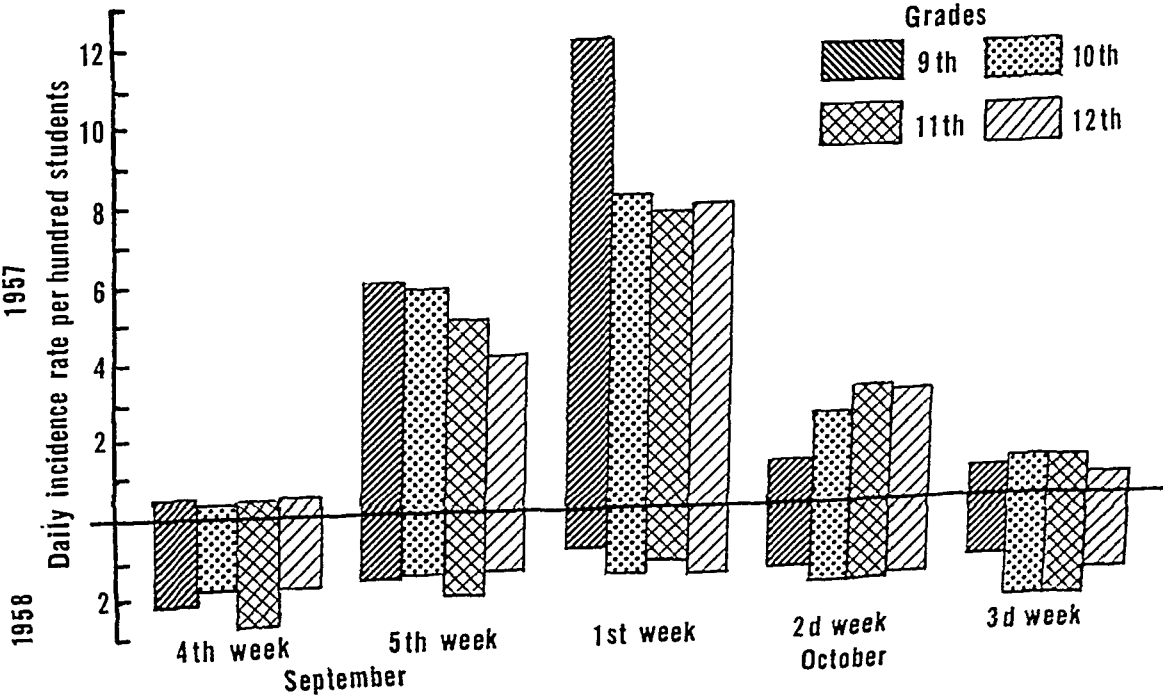


Table 1. Percent frequency of signs and symptoms in 300 students¹ of Dormont High School by week of onset of illness, September–October 1957

Sign or symptom	Onset of illness		
	Sept. 30–Oct. 6 (N=109)	Oct. 7–13 (N=141)	Oct. 14–23 (N=50)
Cough.....	80	85	72
Fever.....	81	80	66
Headache.....	71	77	70
Sore throat.....	67	72	52
Running nose.....	60	70	58
Weakness.....	58	55	42
Body aches.....	61	40	46
Chills.....	49	45	44
Dizziness.....	39	30	28
Retrobulbar pain.....	27	26	22
Stomach ache.....	28	17	26
Nausea or vomiting.....	23	17	14
Diarrhea.....	2	6	6
Days absent:			
3 days or less.....	49	51	78
4 days or more.....	51	49	22

¹ Includes only ill students in volunteer group.

the end of the last time period, observations were not available on students still absent because of illness. Because of persisting absence these students might have been expected to have a large number of symptoms and signs to report and to have longer illnesses.

Serologic Studies, 1957

Approximately two-thirds of the Dormont pupils volunteered to give blood samples in the 1957 study. The rate of volunteering was equal for girls and boys (69 percent and 68 percent, respectively). Girls in all grades volunteered at approximately the same rate, but boys were more numerous in the 9th and 10th grades (80 percent) than in the 11th and 12th grades (53 percent). Participation by classrooms varied from 52 to 89 percent. The lowest rate of volunteering was in one sophomore classroom; only 47 percent of the girls volunteered to give blood samples.

To determine the degree to which the volunteers were typical of the entire high school population, they were compared with the non-volunteering students in respect to rate of ab-

sence and characteristics and severity of illness experienced in the preceding month. The frequencies of specific signs and symptoms are similar in the two groups (table 2). The rates of absence and illness were also similar for the two groups. The close agreement in illness experience in the two groups indicates that the students volunteering to give blood specimens were representative of the whole school population.

Student	Ill and absent (percent)	Ill, not absent (percent)	Neither ill nor absent (percent)
Volunteer	74	9	17
Nonvolunteer	75	6	19

The association was determined between levels of influenza CF antibody and various aspects of illness experience in the 429 Dormont volunteers. There was a consistent tendency for students with higher antibody titers to report various signs and symptoms more frequently. The frequency of symptoms as well as illnesses was markedly diminished in those without detectable antibody (table 3). Similarly, in the other six schools, children without measurable antibodies (titers less than 1:20) were less often ill during the preceding month or, when ill, had fewer signs and symptoms than children with detectable levels of antibody.

Only 23 Dormont students reported receiving influenza vaccinations sometime in the 6 weeks

Table 2. Symptomatology of volunteers and nonvolunteers in Dormont High School ill during September–October 1957

Sign or symptom	Percent with illness showing sign or symptom	
	Volunteer (N=349)	Nonvolunteer (N=178)
Cough.....	79	74
Fever.....	76	62
Headache.....	73	69
Sore throat.....	65	64
Running nose.....	64	64
Weakness.....	52	44
Body aches.....	47	38
Chills.....	45	39
Dizziness.....	33	31
Retrobulbar pain.....	25	19
Stomach ache.....	22	19
Nausea or vomiting.....	18	14
Diarrhea.....	4	5

The pattern of spread within Dormont (HS 4) was examined in detail. It was assumed that students within a given grade were more intimately in contact with one another and that if the epidemic within the school had started first in a small group, such a pattern of spread might be detected by studying absence by grade and time. The daily incidence rate of absence by grade during the period of the epidemic showed no evidence of differences in time, except possibly in the more explosive development of disease in the ninth grade (fig. 2).

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Figure 2. Daily incidence rate of absence by week in students by grade, Dormont High School, September–October 1957 and 1958

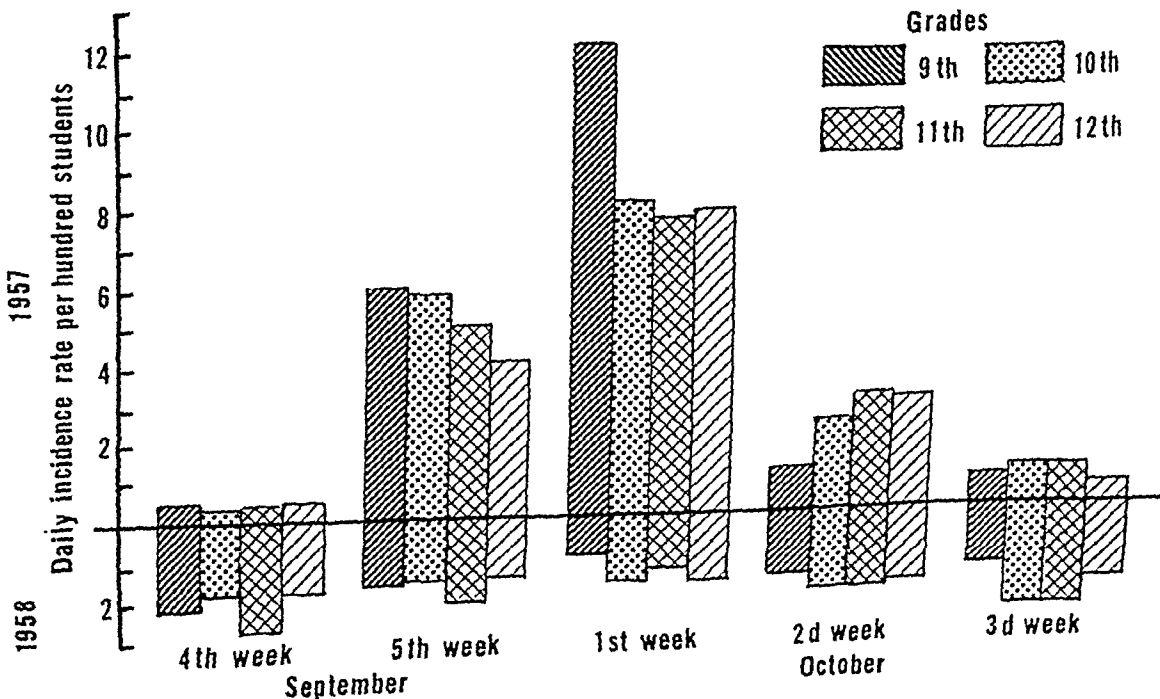
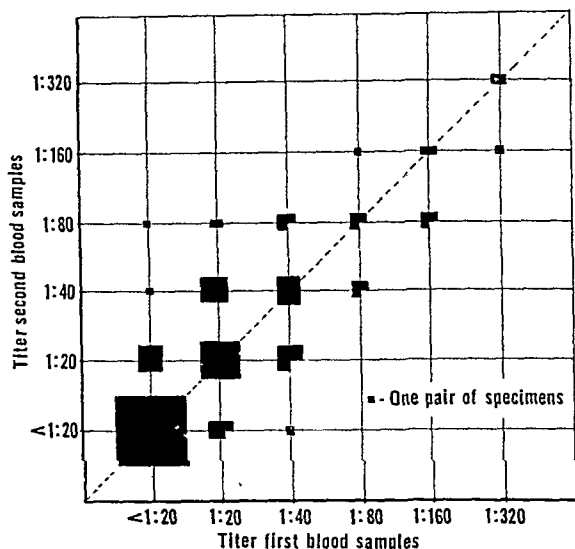


Figure 3. Relationship of first and second influenza CF antibody titers in 175 students, Allegheny County, Pa., October–November 1957



versely, of those with illness late in the epidemic, more had rising than falling titers. However, the magnitude of most of these rises and falls was only twofold, and only 7 percent of patients previously negative became positive by the time the second specimens were obtained. The constancy of antibody level in successive samples suggests that presence of antibody was not a transient phenomenon likely to be missed by variations in the time of sampling. Therefore, the absence of antibody with the influenza syndromes can not be explained on the basis of the time the specimens were obtained.

Second blood samples, obtained from an additional 79 students in two other high schools, confirmed the close agreement between antibody levels on specimens obtained 3 to 4 weeks apart (fig. 3).

Hypothetical Influenza Syndromes

The signs and symptoms were ranked in order of frequency of occurrence in Dormont students exhibiting measurable antibody (table 3). This was assumed to constitute a measure of sensitivity of a particular symptom or sign as indicating influenza infection. However, certain of these were also noted with high frequency in children lacking antibody. Therefore, a measure of specificity was also de-

veloped and was expressed as the ratio of the frequencies with which given symptoms and signs occurred in the antibody present and undetectable groups. These ratios were ranked in order of magnitude. The sum of the rank order of sensitivity and the rank order of specificity was calculated. For example, cough was first in sensitivity and fourth in specificity, giving a sum of five. The signs and symptoms with the lowest sums of sensitivity-specificity ranks were presumed most likely to be characteristic of Asian influenza. These were cough, fever, headache, weakness, chills, and dizziness.

Using the results of these sensitivity-specificity ratings, three categories of illness were arbitrarily defined: (a) strict influenza syndrome which consisted of a history of absence from school with an illness having three or more of the following symptoms or signs: cough, fever, headache, weakness, chills, and dizziness; (b) modified influenza syndrome which consisted of an illness having three of the above symptoms or signs without absence or two of the symptoms and signs with absence; (c) other disease which consisted of any illness, regardless of absence, not fitting the strict or modified syndrome categories. The three groups were mutually exclusive.

When students were divided into these illness categories or grouped according to antibody titer, there appeared to be a gradient of illness involvement (moving from strict syndrome, to modified syndrome, to other disease, to no disease) which was directly associated with the height of antibody titers (fig. 4).

Comparison 1957, 1958

All 804 Dormont students again answered questions concerning the characteristics of illness experienced during September and October of 1958. These data were compared with data collected in 1957. Illness-absence experience for 1958 was classified by grade.

Grade	Ill and absent (percent)	Ill, not absent nor absent (percent)	Neither ill nor absent (percent)
9	23	9	68
10	24	11	65
11	27	6	67
12	22	5	73
All students	24	8	68

Table 3. Percent frequency of signs and symptoms in relation to the level of influenza CF antibody in serums from 429 students, Dormont High School, September–October 1957

Sign or symptom	CF antibody titer			Ratio of percent present ¹ to percent absent ²
	1:40 or greater (N=158)	1:20 (N=78)	Less than 1:20 (N=193)	
Cough.....	92	69	42	2.0
Fever.....	86	68	42	1.9
Headache.....	78	65	45	1.6
Sore throat.....	66	55	42	1.5
Running nose.....	62	61	41	1.5
Weakness.....	66	45	24	2.5
Body aches.....	50	36	30	1.5
Chills.....	56	46	20	2.6
Dizziness.....	45	29	12	3.3
Retrobulbar pain.....	23	28	15	³ 1.7
Stomach ache.....	22	16	17	³ 1.1
Nausea or vomiting.....	22	15	8	³ 2.5
Diarrhea.....	6	4	2	³ 2.5
No illness.....	3	10	32	.2

¹ Titer 1:20 or greater. ² Titer less than 1:20. ³ Derived from fewer than 35 students.

preceding October 24, 1957. In this small group the proportion of those with present or undetectable antibody titers as well as the proportion of those experiencing illness in the September–October period paralleled that of the nonimmunized group. For this reason the effect of immunization was not considered in this study.

Duration of absence also varied in relation to CF antibody titers. Dormont students (including those without illness) with titers of 1:80 or greater against Asian influenza averaged 3.7 days absence; with titers of 1:40, 3.5 days; with titers of 1:20, 2.8 days; and with titers less than 1:20, 1.7 days.

While it was possible to identify certain symptoms and signs with the epidemic illness and to demonstrate that students exhibiting these were more likely to have detectable CF antibody, the association of history of illness and serologic evidence of infection was not absolute. Students ill and absent but without detectable antibodies and students with less severe illness not requiring absence had quantitatively rather than qualitatively different symptomatology from students with typical

illness and detectable antibody levels. Even with mild illness, symptoms and signs, although less frequent than with typical illness, were often those associated with influenza-like disease rather than with distinctly different disorders.

These observations were consistent with infection by a single rather than several agents. Individual variations in response to infection could have resulted from differing degrees of exposure to the agent, differing host thresholds for clinical symptoms and signs with infection, or from differing host ability to produce CF antibody following infection. The fact that children without a history of illness also gave evidence, in some cases, of CF antibody formation supports this interpretation.

Many students gave histories of illness typical of the epidemic disease during September and October 1957 but showed no demonstrable influenza CF antibody. One explanation for this observation would be that these students experienced illness so near to the time when blood samples were obtained that antibody rise had not yet taken place. Therefore, to test this hypothesis, second samples were obtained from 175 children 2 to 3 weeks later.

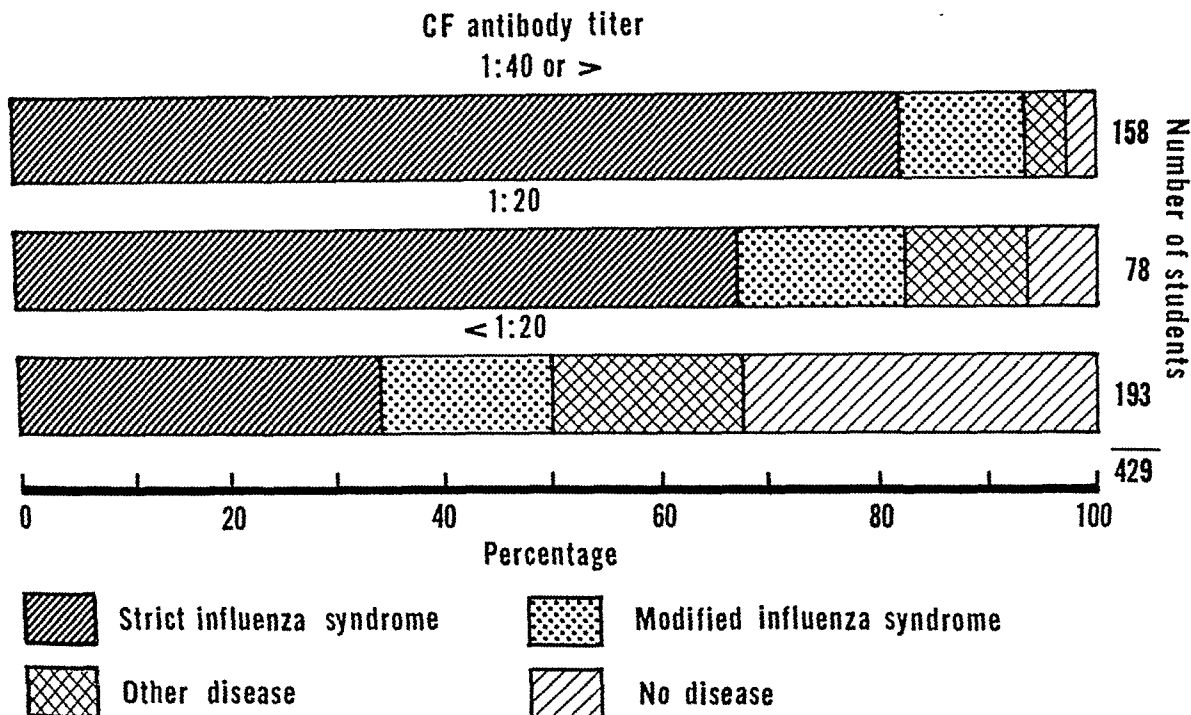
At Dormont, 96 donors of second blood samples were selected from the original volunteers according to their illness experience. The results in the various groups are given in table 4. Of those with illness early in the epidemic, only 3 percent had a rising titer, while approximately 20 percent had a falling titer. Con-

Table 4. Relationship of first and second influenza CF antibody levels in paired specimens from 96 students with varied illness experience, Dormont High School, 1957

Group	Number tested	Rising titer ¹ (percent)	Falling titer ¹ (percent)	No change (percent)
Ill and absent Sept. 24–Oct. 14.....	32	3	22	75
Ill and absent Oct. 14–24.....	23	22	13	65
Ill, not absent Sept. 24–Oct. 24.....	17	0	18	82
Not ill or absent Sept. 24–Oct. 24.....	24	13	8	79

¹ A twofold or greater change in titer.

Figure 4. Relation of clinical gradient of illness involvement to level of influenza CF antibody, Dormont High School, September–October 1957—Continued



week, and about 70 percent of the children were absent at some time during this period. Prevalence rates and length of absence (approximately 3.5 days) were similar for all grades. Attempts to isolate an influenza virus from throat swabs of 17 students in the first day of clinical illness were unsuccessful.

Clinical characteristics of the illnesses were studied to determine the possible etiological agent and the proportion of absence caused by the illnesses. The 1957–58 questionnaire concerning signs and symptoms of illness was given to 103 children returning from absence on March 16 and 17, 1959. Sixty percent of children had symptomatology compatible with the strict influenza syndrome previously described, 17 percent were classified as modified syndrome, and 23 percent as other disease. These figures were in close agreement with the symptomatology reported with Asian influenza in 1957 and markedly different from the experience in October 1958.

Because of the high prevalence of the characteristic influenza syndrome, the known high level of immunity to Asian influenza in this population, and the isolation during the same

time period of influenza type B in similar outbreaks in other parts of the United States, it was considered likely that most of the absence in Dormont High School from March 9 to 27, 1959, was due to influenza type B infection.

Virus Isolation

Starting in July 1957 throat swabs and washings for virus isolation from patients suspected

Figure 5. Gradient of illness involvement of Dormont High School students, September–October 1957 and 1958

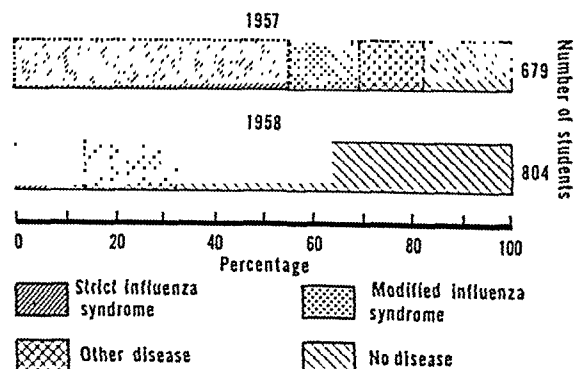
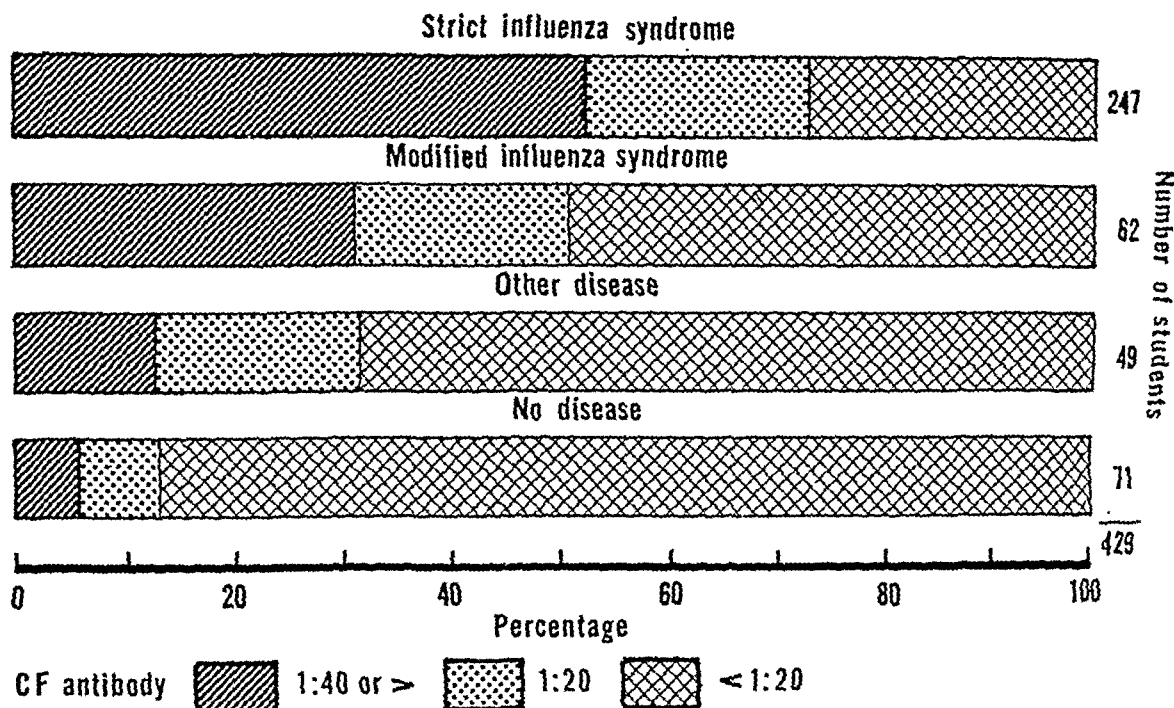


Figure 4. Relation of clinical gradient of illness involvement to level of influenza CF antibody, Dormont High School, September–October 1957



Again, there was no difference in the pattern by grade. However, when the 2 years were compared, there were approximately one-third as many in the category of ill and absent and approximately four times as many in the category neither ill nor absent in 1958 as in 1957.

When 1958 incidence rate of absence was plotted by grade (fig. 2), there was no variation by week or grade.

When symptoms and signs exhibited during illness were compared for the 2 years, students in 1957 not only reported almost twice as many symptoms and signs per illness, but certain specific signs and symptoms were much more frequently reported. Fever, weakness, chills, body aches, and pain behind the eyes were reported two and a half to more than three times as frequently in illnesses occurring in the epidemic year. On the other hand, the frequencies with which diarrhea, nausea or vomiting, and stomach ache were reported were essentially the same in both years.

Illnesses of 1958 were grouped according to the 1957 classification of strict and modified influenza syndromes, other disease, and no disease. The percentage of students falling into each

category differed markedly in the 2 years (fig. 5). Because of the great difference in the numbers of children with no disease between 1957 and 1958, only ill children were considered. It appears that the illnesses experienced in 1957 and 1958 differed markedly not only in attack rate but also in symptomatology.

Category	Percent ill children by category	
	1958	1957
Strict influenza syndrome.....	17.9	66.6
Modified influenza syndrome.....	25.3	17.7
Other disease.....	56.8	15.7

Spring 1959 illness

During March and April 1959 increased school absenteeism due to influenza-like illness was reported to the Public Health Service from 29 States and the District of Columbia. In 16 States and the District isolations of type B influenza were reported but they were few in number and made with difficulty.

Between March 9 and 27, 1959, absence in Dormont High School reached a peak of 23 percent of the enrollment during the second

but also development of serologic evidence of infection in asymptomatic subjects. Therefore, the minimum incidence of Asian influenza infection in the Dormont school was considered to be represented by the number of children exhibiting specific antibody or a history consistent with the influenza syndromes, or both. The incidence, thus determined, was 78 percent.

Since the antibody test identified few children who were not already identified by the clinical pattern of illness, but not vice versa, it was concluded that clinical history alone (presence of influenza syndromes) might constitute a satisfactory estimate of the incidence of Asian influenza infection. If such a clinical history index were also a valid measure of incidence of influenza infection due to other types, it would have the advantage of minimizing the need for laboratory studies. However, the syndrome derived from an epidemic experience is not necessarily applicable in non-epidemic years. In the fall of 1958 no isolations of influenza virus were made locally and essentially none was reported nationally. Yet, during this same period 5 percent of the population of Dormont High School demonstrated the strict influenza syndrome, and 7 percent, the modified influenza syndrome.

The method described in this study for establishing incidence of a specific infection during an epidemic might be applied to the study of other epidemic illnesses. The method consists of selecting the signs and symptoms reported most frequently with illnesses during an epidemic period (sensitivity); obtaining blood samples during the acute and convalescent stage (or in the convalescent stage only with a newly introduced agent) from a representative sample of the study population to determine antibody against the determined etiological agent; and calculating the signs and symptoms most frequently present in patients exhibiting changes in titer of specific antibody (specificity). By combining sensitivity and specificity indexes, a clinical syndrome may be

constructed for use in estimating incidence of specific illness in other groups during an epidemic.

Summary

The etiology of an epidemic of acute influenza-like illness in Allegheny County, Pa., in the fall of 1957 was investigated. High school students were questioned concerning symptomatology of any illnesses during this time period and CF tests against the Asian variant of influenza type A were done on blood samples from part of this group. The signs and symptoms reported most commonly with illness during this period (sensitivity) were combined with the signs and symptoms most frequently present in patients exhibiting changes in titer of specific antibody (specificity). The combined sensitivity-specificity index was used to construct a clinical syndrome considered appropriate for estimating incidence of specific illness during an epidemic period.

REFERENCES

- (1) Carey, D. E., et al.: Community-wide epidemic of Asian strain influenza. *J.A.M.A.* 167: 1439-1463, July 19, 1958.
- (2) Widelock, D., Klein, S., Peizer, L. R., and Simonovic, O.: Laboratory analysis of 1957-1958 influenza outbreak (A/Japan) in New York City. I. Preliminary report on seroepidemiologic investigation and variant A/Japan isolate. *J.A.M.A.* 167: 541-543, May 31, 1958.
- (3) Perrott, G. St.J., and Linder, F. E.: Data on acute upper respiratory diseases. *Pub. Health Rep.* 73: 121-128, February 1958.
- (4) Fry, J.: Influenza A (Asian) 1957, clinical and epidemiological features in a general practice. *Brit. M.J.*, 1: 259-261, Feb. 1, 1958.
- (5) Greene, L. S., and Hair, T. E.: Clinical experience with 682 cases of Asian influenza. *U.S. Armed Forces M.J.* 9: 385-390, March 1958.
- (6) Forbes, J. A.: Severe effects of influenza virus infection. *M.J. Australia.* 2: 75-79, July 19, 1958.
- (7) Bell, J. A., et al.: Artificially induced Asian influenza in vaccinated and unvaccinated volunteers. *J.A.M.A.* 165: 1366-1373, Nov. 16, 1957.

Table 5. Asian variant type A influenza virus isolations from specimens received by the Allegheny County Health Department laboratory, July–December 1957

Month	Throat swab or washing		Autopsy: lung tissue or bronchial swab	
	Number specimens	Percent positive	Number specimens	Percent positive
July.....	1	0	(?)	-----
August.....	5	0	(?)	-----
September.....	59	15	(?)	-----
October.....	371	30	24	58
November.....	25	4	6	0
December.....	12	0	6	0

¹ No specimens.

of having influenza were received at the Allegheny County Health Department laboratory. As illness in the community increased and physicians became more aware of the diagnostic service available, more specimens were submitted. In the last quarter of the year lung tissue and bronchial secretions obtained at autopsy were also submitted. Asian variant type A influenza virus was isolated in 1957 only during September, October, and November. The data indicate that the highest percentage of virus isolation from specimens from all sources occurred during October when the population of the county was experiencing the peak of an epidemic (table 5).

Discussion

Both serologic and clinical indexes were used to estimate the incidence of infections caused by Asian variant influenza type A virus in the 1957 epidemic in Dormont High School. Since this virus was newly introduced into the United States during the summer and late fall of 1957, the percentage of persons showing antibody to it after an epidemic of influenza-like illness could be considered one index of group infection. In other populations studied after such an epidemic illness in the same year, specific antibodies (CF or hemagglutination inhibition) were reported in 35 to 75 percent of persons (with and without history of illness) from whom blood samples were obtained (1,

2). In Dormont High School specific antibody was exhibited by 55 percent of the total population studied and in 63 percent of those children ill during the epidemic.

The validity of using the clinical history as an index of influenza infection was based on the highly characteristic signs and symptoms occurring in previous influenza epidemics and reported in the 1957 influenza-like illnesses in various parts of the world (1, 3-6). These were fever, headache, cough, sore throat, fatigue or malaise, chills or chilliness, ocular pain, and bone, muscle, and joint ache. Nausea, diarrhea, abdominal pain, chest pain, and rash were almost always absent. In addition, these illnesses were characterized by sudden onset, high attack rate, moderate severity, short duration, and rare complication by secondary infection.

A majority of these symptoms was also evidenced in histories given by ill students in the Dormont school. Sixty-seven percent exhibited a strict influenza syndrome consisting of absence from school plus three or more of these signs and symptoms—fever, cough, headache, dizziness, chills, and weakness. Further evidence that this 1957 epidemic illness had distinct symptomatology was supplied by a study of illness characteristics during the same time period the following year. In 1958 only 18 percent of the ill children exhibited the strict influenza syndrome.

In the previously cited studies of Asian influenza infections in other populations, positive association between a clinical history of influenza-like illness and presence of specific antibody was reported. In Dormont High School this was also true. Sixty-seven percent of children with strict influenza syndrome had detectable levels of specific antibody as compared with 50 percent with the modified influenza syndrome, 31 percent with other illness, and 13 percent with no illness. However, the lack of association between presence of antibody and a history of influenza-like illness has also been reported previously in both natural and experimental infections. Bell and associates (7) artificially induced Asian influenza infections in volunteers and demonstrated not only variations in clinical response of different individuals given equal dosage of virus

Michigan

University of Michigan, Ann Arbor: equipment for previous construction grant for college of pharmacy, \$17,500.

Wayne State University, Detroit: equipment for previous grant for microbiology and organic chemistry research facilities, \$47,250.

Minnesota

University of Minnesota, Minneapolis: equipment for biological laboratory building for Hormel Institute, \$28,002.

Missouri

Washington University, St. Louis: equipment for previous grant for medical research laboratories, \$68,250.

Montana

Montana State College, Bozeman: equipment for veterinary research building, \$14,331.

Nebraska

University of Nebraska, Omaha: equipment for previous grant for research addition to university hospital, \$21,350.

New York

Beth Israel Hospital, New York: renovation and expansion of research laboratories and equipment, \$184,865.

Maimonides Hospital, Brooklyn: equipment for medical science research building, \$38,500.

State of New York (Roswell Park Memorial Institute), Buffalo: equipment for previous grant for basic science research institute in field of cancer and allied diseases, \$56,525.

University of Buffalo, Buffalo: equipment for health sciences building, \$48,828.

Waldemar Medical Research Foundation, Port Washington: equipment for basic medical research, \$1,062.

North Carolina

University of North Carolina, Chapel Hill: additional grant for medical science research building, \$25,300; research equipment for school of pharmacy, \$36,750; school of public health research facility, \$653,000.

Ohio

Children's Hospital, Columbus: equipment for medical science research building, \$15,750.

Columbus Psychiatric Institute and Hospital, Columbus: equipment for addition to psychiatric research wing, \$31,282.

Ohio State University, Columbus: equipment for sanitary engineering research facility, \$5,000; equipment for veterinary pathology research building, \$50,000.

Western Reserve University, Cleveland: equipment for research, Mather Building, \$165,865.

Oregon

Reed College, Portland: addition to chemistry building, \$47,529.

University of Oregon Medical School, Portland: medical science research building and equipment, \$1,297,955.

University of Oregon Dental School, Portland: basic science research laboratories, \$71,900.

University of Oregon, Eugene: expansion of science building for Institute of Molecular Biology, \$277,641.

Pennsylvania

St. Christopher's Hospital, Philadelphia: equipment for pediatric research laboratories, \$17,500.

University of Pennsylvania, Philadelphia: equipment for previous grants for medical research buildings, \$130,095.

Rhode Island

Brown University, Providence: building for research in biology, \$476,700.

Tennessee

Meharry Medical College, Nashville: medical research building, \$200,000.

University of Tennessee, City of Memphis Hospitals: radiological research facility and equipment, \$144,422.

University of Tennessee, Memphis: dental-pharmacy research facility and equipment, \$325,000.

Virginia

University of Virginia, Charlottesville: life sciences research building, \$612,500.

Washington

State College of Washington, Pullman: biological sciences annex, \$377,498; plant sciences research building, \$65,000.

Wisconsin

University of Wisconsin, Madison: equipment for chemical research laboratory, \$7,221.

Health Research Facilities Grants

Fifty-seven grants to help build and equip additional health research facilities were approved by the Public Health Service in August 1959 for 47 institutions in 23 States and the District of Columbia.

The grants, totaling \$11,235,480, are made on a matching-fund basis. They are authorized by the contingent resolution for fiscal year 1960 passed by the Congress on June 30, 1959, and are the first awards under the 3-year extension authorized by the 85th Congress during 1958. The extended program, like the initial one set up in 1956, has at its disposal \$30 million annually.

Administered by the National Institutes of Health, Public Health Service, the health research facilities construction program awards grants to both public and nonprofit hospitals, medical and dental schools, schools of public health, and other research institutions. The recipient institutions and facilities follow.

Alabama

University of Alabama, Birmingham: equipment for clinical research laboratories, \$144,126.

California

The California Institute of Technology, Pasadena: equipment for sanitary engineering research, \$39,900.

City of Hope Medical Center, Duarte: facilities for medical research \$112,000.

Stanford Research Institute, Menlo Park: biological research laboratories and equipment, \$300,000.

University of California, Los Angeles: scientific equipment for new wing of medical center for basic research in neurology and psychiatry, \$107,625.

University of California, Berkeley: health sciences research building and equipment, \$1,292,975.

University of San Francisco: equipment for previous award for chemistry and biology research laboratories, \$8,778.

District of Columbia

Catholic University of America: biology building and equipment, \$216,642.

Georgetown University: science and basic health research building, \$350,000.

Florida

Florida Agricultural Experiment Station, University of Florida, Gainesville: research equipment for previous construction grant for veterinary science, \$15,064.

National Children's Cardiac Center, Miami: medical research building and equipment, \$72,877.

Illinois

Armour Research Foundation of Illinois Institute of Technology, Chicago: equipment for previous construction grant for research laboratories in chemistry building, \$12,250.

Presbyterian-St. Luke's Hospital, Chicago: equipment for previous construction grant for medical science research building, \$24,780.

University of Chicago, Chicago: clinical research building, \$1,068,034; research equipment for chronic disease hospital, \$11,489.

University of Illinois, Chicago: construction and equipment for research in zoonoses, \$128,100.

Indiana

Purdue University, Lafayette: research facilities for speech pathology and bioacoustics, \$24,331.

Indiana University, Bloomington: psychological research building, \$543,700.

Kansas

Kansas State University of Agriculture and Applied Science, Manhattan: dairy and poultry research building, \$93,020.

University of Kansas Medical Center, Kansas City: medical science building and equipment, \$850,200.

Maryland

Johns Hopkins University, Baltimore: equipment for previous grant for biophysics research building, \$22,806.

Massachusetts

Massachusetts General Hospital, Boston: equipment for previous grant for research facilities at McLean Hospital, Waverly, \$5,775.

Massachusetts General Hospital, Boston: expansion, remodeling, and equipment for pediatric neurology research unit, \$98,425.

University of Massachusetts, Amherst: bacteriology and zoology research laboratories and equipment, \$132,212.

Animal Inhalation Exposure Chambers

Public Health Monograph No. 57

Exposure Chambers for Research in Animal Inhalation. By David A. Fraser, Ronald E. Bales, Morton Lippmann, and Herbert E. Stokinger. Public Health Monograph No. 57 (PHS Pub. No. 662), 54 pages, illustrated. U.S. Government Printing Office, Washington, D.C., 1959, price 40 cents.

The accompanying summary covers the principal contents of Public Health Monograph No. 57, published concurrently with this issue of *Public Health Reports*. The authors are with the Occupational Health Field Headquarters, Occupational Health Branch, Public Health Service.

For readers wishing the data in full, copies are on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Official agencies and others directly concerned may obtain single sample copies without charge from the Public Inquiries Branch, Office of Information, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

The phenomenal increase in the amounts and kinds of chemicals used in industry, in the defense establishments, and in the home, with attendant concern about the potential health effects of community air pollution, has aroused a demand for toxicity information that can be gained only through carefully controlled studies of inhalation toxicology. New investigators entering the field often encounter a bewildering array of sizes and shapes of exposure chambers and accessory equipment, and are faced with the choice of either copying a chamber designed by a previous worker for a different set of conditions or developing their own design through a time-consuming series of trial and error experiments.

To help these investigators avoid some common difficulties and sources of error, the Occupational Health Branch of the Public Health Service has prepared a monograph on exposure chambers for research in animal inhalation, drawing on more than 40 years' experience with animal inhalation studies by investigators in its laboratories, as well as the experience of other research centers and private investigators.

The Occupational Health Field Headquarters laboratory currently uses four types of total-enclosure exposure chambers: large-scale, control, small-scale, and pilot. The features of each type that have proved of value in ease of operation and maintenance, in reliability of performance, and in adaptability are described in detail. Emphasis is placed on the fundamental requirements of the chambers and the reason for each particular design. Design considerations, such as size, shape, construction materials, maintenance, animal complement and placement, airflow requirements, heat balance, and air conditioning, are discussed.

Since the maintenance of a desired test atmosphere is the most important aspect of animal exposure chamber operation, attention is given to the various interdependent factors which influence this atmosphere. All test atmospheres fall into one of three general categories: dispersion of solid particulates in air, mist or dispersion of liquid droplets in air, and gas or vapor forming a single and homogeneous phase with air. These are dealt with in order of decreasing complexity and difficulty of producing and maintaining satisfactory performance in the chamber. Basic equations and formulas affecting particles and chamber dynamics are given and used to predict the performance of specific chambers.

Routine day-to-day operation of the chambers is described with suggestions for safety

PUBLICATION ANNOUNCEMENTS

Address inquiries to the publisher or sponsoring agency. WHO publications may be obtained from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.

A Psychiatric Look at Children. Special issue of Public Health News, vol. 40, No. 6, June 1959, pp. 155-215. New Jersey State Department of Health, 129 East Hanover Street, Trenton 25, N.J.

Automobile Litter Containers. Project guide number 1. 18 pages. Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

Litter Receptacles. Project guide number 2. 17 pages. Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

Litter Laws. Project guide number 3. 34 pages. Keep America Beautiful, Inc., 99 Park Avenue, New York 16, N.Y.

10 Years of Cleansing New Jersey's Streams and Waters. A summary report of activity, 1948-1958. 37 pages. New Jersey State Department of Health, 129 East Hanover Street, Trenton 25, N.J.

Easter Seal Research Foundation. A report. 1959; 40 pages. National Society for Crippled Children and Adults, Inc., 2023 West Ogden Avenue, Chicago 12, Ill.

Food Guide for Older Folks. Home and Garden Bulletin No. 17. Prepared by Institute of Home Economics, Agricultural Research Service, U.S. Department of Agriculture. Revised June 1959; 16 pages; 10 cents. U.S. Government Printing Office, Washington 25, D.C.

A Statement on Arteriosclerosis. Main Cause of "Heart Attacks" and "Strokes." By Paul Dudley White, M.D., and others, supported by 106 members of the American Society for the Study of Arteriosclerosis. 19 pages. National Health Education Committee, Inc., 135 East 42d Street, New York 17, N.Y.

Group Methods in Therapy. Public Affairs Pamphlet No. 284. By Jerome D. Frank, M.D. 1959; 28 pages; 25 cents. Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y.

Progress and Problems of Community Mental Health Services. Papers presented at the 1958 Annual Conference of the Milbank Memorial Fund, held October 22-23, 1958, at the New York Academy of Medicine. Part I. 1959; 232 pages; \$2. Milbank Memorial Fund, New York, N.Y.

Progress in Action. How the Metropolitan Sewer District Brings Sewers to Your Neighborhood for a Healthier and More Attractive Community. 9 pages. Metropolitan St. Louis Sewer District, 901 Washington Avenue, St. Louis 1, Mo.

"You Are Not Alone." A guide to sources of care and treatment of the crippled child. By Lawrence J. Linck. 1959; 32 pages; 25 cents. National Society for Crippled Children and Adults, Inc., 2023 West Ogden Avenue, Chicago 12, Ill.

Food Habits of New Canadians. A report prepared by the Toronto Nutrition Committee. 1959; 36 pages; 50 cents. Bakery Foods Foundation of Canada, 20 Carlton Street, Toronto 5, Ontario, Canada.

General Handbook for Radiation Monitoring. Compiled and edited by Jerome E. Dummer, Jr., for the U.S. Atomic Energy Commission. 1959; 180 pages; 60 cents. U.S. Government Printing Office, Washington 25, D.C.

Home Care of the Child with Rheumatic Fever. A Guide for Parents. 1959; 25 pages; no charge for single copies. American Heart Association, 44 East 23d Street, New York 10, N.Y.

Let's Be Practical About a Nursing Career. With a list of State approved schools of practical nursing, 1959-1960. May 1959; 36 pages. Committee on Careers, National League for Nursing, 10 Columbus Circle, New York 19, N.Y.

Coccidioidomycosis (Valley Fever) in Arizona. Special issue of Arizona Public Health News, vol. 52, No. 2, March-April 1959, 27 pages. Arizona State Department of Health, Phoenix.

Released Mental Patients on Tranquilizing Drugs and the Public Health Nurse. Nursing Research Monograph No. 1, Department of Nurse Education, New York University. By Ida Gelber, Ed.D., R.N. 1959; 139 pages; \$3. New York University Press, Washington Square, New York 3, N.Y.

Agricultural Migrant Film Listing. June 1959; 8 pages. Division of General Health Services, Public Health Service, Washington 25, D.C.

News in Review. Monthly newsletter from the Metropolitan Sewer District to local governments on problems of mutual significance. (Distributed to officials and elected representatives in the Greater St. Louis area.) Metropolitan St. Louis Sewer District, 901 Washington Avenue, St. Louis 1, Mo.

World Health Organization

Zoonoses. Second Report of the Joint WHO/FAO Expert Committee on Zoonoses. WHO Technical Report Series No. 169. 1959; 83 pages; 60 cents.

Mental Health Problems of Aging and the Aged. Sixth Report of the WHO Expert Committee on Mental Health. WHO Technical Report Series No. 171. 1959; 51 pages; 60 cents.

Biological Standardization. Twelfth Report of the WHO Expert Committee on Biological Standardization. WHO Technical Report Series No. 172. 1959; 43 pages; 30 cents.

Cholera. By R. Pollitzer, M.D. WHO Monograph Series No. 43. 1,000 pages; \$20.

World Directory of Venereal-Disease Treatment Centres at Ports. Application of the International Agreement of Brussels, 1921, respecting facilities to be given to merchant seamen for the treatment of venereal diseases. 1959; 162 pages; \$1.75.

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Routine day-to-day operation of the chambers is described with suggestions for safety

precautions and increased precision of operation through the use of automatic accessory equipment. Some of the forms and methods that are used by the laboratory for recording data can serve as a guide for newcomers in the field.

With an understanding of these fundamental concepts, the investigator should be able to modify any of the chambers described to meet

the requirements of his own experiment with a minimum of time and effort and little sacrifice of essential performance characteristics.

The monograph also includes a comprehensive and critical summary of the literature and history of animal inhalation exposure chambers from the first report in 1865 to the present. There are more than 80 references and 30 illustrations and tables.

Epidemiological Notes

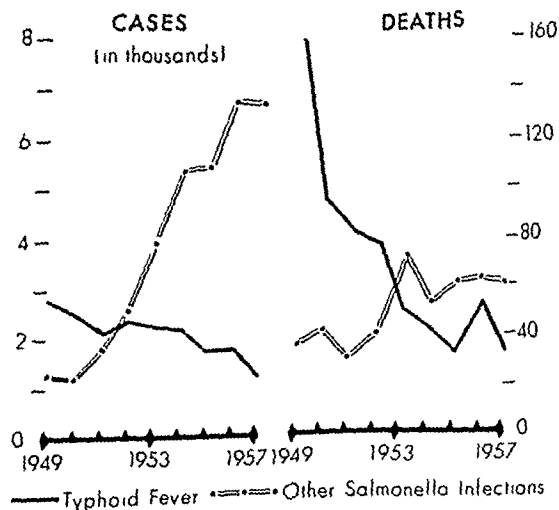
Salmonellosis

During the past decade, while typhoid fever has been reported less frequently and has caused fewer deaths from year to year, other *Salmonella* infections have shown the opposite trend. In 1950 twice as many cases and deaths from typhoid fever were recorded as for other *Salmonella* infections (see chart). In 1957, however, there were five times more cases of the latter than of typhoid fever, and the number of deaths was also in excess of those for typhoid fever. The increase in deaths has been more evident in young children and in persons over the age of 55 years.

The increase in number of reported cases of *Salmonella* infections, exclusive of typhoid fever, probably is due mainly to more complete notification which has followed greater awareness of these infections and an improvement in facilities for laboratory diagnosis. It also seems reasonable to assume that more frequent certification of deaths from these infections is due partly to such factors.

As typhoid fever has only one known reservoir of infection, man, its control is relatively simple. The other *Salmonella* infections are common to many species of animals, as well as man, and the disease can be transmitted not only by contact with infected animals and their excreta but also by consumption of the meat or other products of infected animals. The control of these infections is difficult because they are so widely distributed.—CARL C. DAUER, M.D., medical adviser, National Office of Vital Statistics, Public Health Service.

Numbers of cases and deaths from typhoid fever and other *Salmonella* infections, 1949-57



Federal Publications

Working Paper on Financing Migrant Health Services. *The President's Committee on Migratory Labor; June 1959; 67 pages.*

Methods either currently in use or proposed to finance health services for foreign, offshore, and domestic migratory farmworkers in the continental United States are discussed. A resource document based on the study initiated in May 1957, this paper also describes inherent problems of migratory laborers and emphasizes the need to provide them with year-round health insurance coverage.

A limited number of copies are available from the Division of Special Health Services, Public Health Service, or the President's Committee on Migratory Labor, Department of Labor, Washington 25, D.C.

Brucellosis in the U.S.S.R. A review of the literature. *PHS Publication No. 635; 1959; by Julian Hoptman; 77 pages; 30 cents.*

Designed to acquaint medical scientists with research activities and progress within the U.S.S.R., this monograph evaluates the investigations, related developments, and control of brucellosis in the Soviet Union.

Discussions of the history, epidemiology, clinical aspects, pathology and pathogenesis, biochemical studies, diagnosis, resistance and immunity, and therapy provide a description of brucellosis in man and veterinary problems pertaining to it.

Activities of the National Institutes of Health in the Field of Gerontology, January 1959. *PHS Publication No. 695; 1959; 121 pages.*

Intramural and extramural research and training projects on aging conducted by the National Institutes of Health are listed and briefly described.

Identified as being either primarily or secondarily related to

gerontology, the projects are classified according to major discipline. General, major multidisciplinary, and training projects are listed separately.

Names and addresses of the principal investigators are provided.

Mid-American Conference on Migratory Labor. *Council of State Governments and President's Committee on Migratory Labor; 1959; 50 pages.*

This presentation of the conference proceedings includes recommendations, papers by the principal speakers, and general discussion summaries on children and youth, housing and sanitation, public health and public assistance, and employment.

Copies may be obtained from the President's Committee on Migratory Labor, U.S. Department of Labor, Washington 25, D.C.

Directory of State and Territorial Health Authorities, 1959. *PHS Publication No. 75; 1959 revision; 102 pages; 35 cents.*

Revised as of May 1959, this directory lists personnel of each State and Territorial health department. Included also are officials of other State agencies directing grant-in-aid programs of the Public Health Service and of the Children's Bureau grant program for crippled children's services.

Personnel of the Public Health Service in charge of functions closely associated with State health departments are listed in the appendix.

Serologic Tests for Syphilis, 1959 Manual. *PHS Publication No. 411; revised 1959; 142 pages; \$2.50.*

This water- and grease-proof plastic covered manual provides a ready reference to the latest technical procedures for performing each of the serologic tests for syphilis

commonly employed in the United States.

New tests include fluorescent treponemal antibody, rapid plasma reagin, *Treponema pallidum* complement fixation using small volumes, *T. pallidum* immobilization, one-fifth Kolmer with Reiter protein antigen, and the Kahn test with cardiolipin antigen.

General information and general equipment are included as well as an appendix which describes methods of collecting and preserving sheep blood, preparation of hemolysin, preparation and preservation of complement, and use of merthiolate as a bacteriostat.

Proceedings, 1959 Biennial Conference of the State and Territorial Dental Directors. *PHS Publication No. 698; 1959; 62 pages.*

Principles of human behavior derived from behavioral research and their implications for dental public health practice are the subjects of seven papers. Also included are the address by the president of the Association of State and Territorial Dental Directors, recommendations of the conference, and recommendations of the association.

Sinus Infection (Sinusitis). *PHS Publication No. 172 (Health Information Series No. 34); revised 1959; leaflet; 5 cents, \$2 per 100.* Presents latest information on sinusitis, outlining causes, signs, prevention, and treatment.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

The Public Health Service does not supply publications other than its own.

APPORTIONMENT OF FINANCIAL AID FOR COUNTY HEALTH WORK

By ELBRIDGE SIBLEY, Statistician, Tennessee State Department of Health, and
JOSEPH W. MOUNTIN, Surgeon, United States Public Health Service

INTRODUCTION

There is rapidly developing in the United States a plan of local health organization commonly known as the county health department. Under this plan the rural portions of the county, as well as the contained cities and towns, are served by a single health department. These departments have developed, in most instances, under the leadership and guidance of the State health department.

Financial aid from the State and other sources outside the county has played an important part in the development and stabilization of this movement; yet there does not seem to have been developed an equitable plan of apportionment which could be applied successfully under varying conditions.

PURPOSE OF STATE AID¹

In general, there are three major ends to be served by any system of subsidies from central to local governments for health work: First, a subsidy may be used to encourage the initiation of new projects; second, a system of aid provides a desirable channel through which the central health agency may discharge its responsibility to the local unit of government; third, the subsidy can ease the burden of relatively poor counties and thus make possible a more uniform grade of continuing service.

JANUARY 3, 1930, pp. 1-10

Elbridge Sibley and Dr. Joseph W. Mountin outline plans of apportioning subsidies to local health departments appropriate to the purpose of the aid as well as to local circumstances and resources.

Characteristics of patients and services received in mental health clinics in the United States are summarized for 1955-56 from data supplied by a continuing reporting system.

First National Report on Patients of Mental Health Clinics

ANITA K. BAHN, B.A., and VIVIAN B. NORMAN, B.S.

A NATIONWIDE program of statistical reporting for outpatient psychiatric clinics was established in July 1954 by the National Institute of Mental Health in cooperation with the State mental health authorities. The purpose of this reporting is to provide a nucleus of uniform data on outpatient psychiatric services to aid in planning programs and facilities on a national, State, and community basis. These data also aid clinics in reviewing their own operations. As a practical first step, reporting is limited to the mental health clinics with outpatient services and a psychiatrist in attendance at regularly scheduled hours who takes the medical responsibility for all clinic patients.

The first publications derived from the reporting program were a national directory of clinics (1) and a monograph describing the characteristics and staff of outpatient psychiatric clinics (2) based on data submitted for 1954-55 by more than 95 percent of the clinics in the United States. In this article we are summarizing for the first time national data reported on the characteristics of clinic patients and the services they receive based on infor-

mation for 1955-56. Several State mental health authorities have issued reports on the data submitted by clinics operating in their jurisdictions (3-7). A national report on the community service activities of outpatient psychiatric clinics will be published later.

Although the national statistical program limits requested data on patients to a minimum of basic items of information, collection is difficult. The complex and varied pattern of outpatient psychiatric service causes many problems of definition. To yield uniform data, the definition of a patient, type of service, and diagnostic classifications in particular continue to require review and modification. In many instances it was necessary to install new clinic recordkeeping systems and mechanical tabulating procedures at the State level (8). As a result, by 1956 only 499, or 39 percent, of the 1,294 outpatient psychiatric clinics in the United States were reporting information about their patients.

The number of clinics reporting, by type of clinic and by State, is shown in table 1. Data on patients were reported for some but not all clinics in most of the States. Reporting procedures have since been established for the clinics of the Veterans Administration, the clinics in New York State, and additional clinics in other States.

Since the clinics that reported in 1956 are not

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a probability sample of all clinics in the United States and difficulties of definition still exist, the findings in this summary are provisional and no comparisons are made between States, communities, and types of clinic. These data on nearly 500 outpatient psychiatric clinics, however, provide some insight into the characteristics of patients and the services provided by these facilities. The data also provide a basis for estimating total clinic patients in the United States.

Although outpatient psychiatric clinics perform professional training, research, educational, and other important community serv-

ices, the largest proportion of total effort is spent in direct services to patients with mental disorders or emotional problems who come to the clinic for diagnosis and treatment.

The following definition of a patient was established for statistical reporting: An adult is classified as a patient upon his first face-to-face interview about his own situation with a professional staff member; a child becomes a patient at the time of the first professional interview with the parent or parent substitute about the child's difficulty. If a parent, spouse, or other related person is diagnosed and accepts a separate treatment plan, he is transferred

Table 1. Total number of outpatient psychiatric clinics and number reporting data on patients, by type of clinic and by State, 1956

Clinic classification	Number of clinics		Clinic classification	Number of clinics	
	Total	Reporting		Total	Reporting
Total.....	1, 294	499	By State—Continued		
By State operation or support: ¹			Minnesota.....	12	9
State mental hospital.....	280	74	Mississippi.....	7	7
Other State-operated.....	250	201	Missouri.....	20	10
State-aided.....	300	178	Montana.....	4	4
Non-State-aided.....	400	13	Nebraska.....	10	6
Veterans Administration.....	64	(²)	Nevada.....	0	0
By age group served: ¹			New Hampshire.....	26	20
Children and adults.....	750	261	New Jersey.....	65	20
Children only.....	400	178	New Mexico.....	1	0
Adults only.....	144	² 60	New York.....	330	1
By State:			North Carolina.....	13	11
Alabama.....	8	5	North Dakota.....	1	1
Arizona.....	4	2	Ohio.....	44	25
Arkansas.....	4	2	Oklahoma.....	4	1
California.....	64	21	Oregon.....	12	6
Colorado.....	11	7	Pennsylvania.....	65	24
Connecticut.....	35	31	Rhode Island.....	10	7
Delaware.....	10	8	South Carolina.....	5	4
District of Columbia.....	17	5	South Dakota.....	4	1
Florida.....	21	15	Tennessee.....	5	5
Georgia.....	9	0	Texas.....	21	10
Idaho.....	1	0	Utah.....	5	4
Illinois.....	71	20	Vermont.....	6	6
Indiana.....	16	12	Virginia.....	24	18
Iowa.....	14	10	Washington.....	9	5
Kansas.....	21	15	West Virginia.....	10	7
Kentucky.....	15	7	Wisconsin.....	22	11
Louisiana.....	19	11	Wyoming.....	0	0
Maine.....	8	6	Alaska.....	3	3
Maryland.....	43	37	Hawaii.....	8	0
Massachusetts.....	102	30	Puerto Rico.....	2	1
Michigan.....	51	28	Virgin Islands.....	2	0

¹ Total number of clinics in each classification estimated.

² Only selected data reported for the clinics of the Veterans Administration

³ Excludes 64 clinics of the Veterans Administration.
⁴ Reporting was initiated in New York State on January 1, 1958.

Table 2. Estimated number of patients under care during the year in all outpatient psychiatric clinics and number per 100,000 population, by age group at admission and by sex, continental United States, 1955

Age group (years)	Estimated number of patients (in thousands)			Estimated number per 100,000 population		
	Total	Male	Female	Total	Male	Female
Total.....	379	233	146	234	294	176
Total under 18.....	197	128	69	355	453	253
Under 5.....	24	14	10	129	148	110
5-9.....	75	50	25	439	578	294
10-13.....	56	38	18	511	679	337
14-17.....	42	26	16	460	559	360
Total 18 and over.....	182	105	77	171	206	138
18-20.....	15	8	7	272	335	222
21-29.....	51	30	21	269	341	208
30-44.....	80	47	33	231	283	183
45-64.....	31	17	14	92	103	81
65 and over.....	5	3	2	35	39	32

from collateral to patient status. Services to a patient are considered terminated upon completion of treatment or other appropriate action, or when the patient fails to return to the clinic within 90 days.

Patient Caseload

An estimate has been made of the total patient caseload, by age and sex, for all clinics in the United States for 1955, based on reports submitted by approximately two-fifths of these clinics. The estimate was based on two assumptions. First, it was assumed that for each type of clinic, those serving children only, children and adults, and adults only, the ratio of child and adult patients to professional man-hours was the same in clinics not reporting number of patients as in those reporting. Second, it was assumed that the child and adult patients enrolled during the year had the same relative age-sex distribution as those for whom services were terminated (only sex and minor age groupings are reported at this time). Data on patients of Veterans Administration clinics were estimated separately and based on reports on a sample of patients.

The estimates provide a description of the outpatient psychiatric clinic population in the United States during 1955, but these data do not indicate the total number of mentally ill

since the clinic population is the result of many selective factors. The relationship of the total number of clinic patients to the total mentally ill is unknown.

An estimated 379,000 individuals were clinic patients during the year. This total is composed of 197,000, or 52 percent, children under 18 years of age and 182,000, or 48 percent, adults. Based on these estimates, therefore, 355 children and 171 adults among each 100,000 persons in the total population of the United States were clinic patients during 1955 (table 2).

An earlier survey (9) reported that there were 150,000 child patients, or 330 per 100,000 population, in the United States in 1950. The apparent increase in child clinic patients from 1950 to 1955 may reflect, in whole or in part, differences in definitions and methods of estimation.

The 1955 estimates indicate that among each 100,000 children in school age groups from 5 to 17 years, probably between 400 and 500 were clinic patients sometime during the year. The estimates also show that there would be about 130 preschool children, 250 adults aged between 18 and 44 years, less than 100 adults 45 to 64 years of age, and only 35 aged 65 years and over. The decrease with age in the number of persons under care in clinics during a year per 100,000 population contrasts

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	Total	Reporting		Total	Reporting
Total.....	1,291	199	By State—Continued		
By State operation or support: ¹			Minnesota.....	12	9
State mental hospital.....	280	71	Mississippi.....	7	7
Other State-operated.....	250	201	Missouri.....	20	10
State-aided.....	300	178	Montana.....	4	4
Non-State-aided.....	100	13	Nebraska.....	10	6
Veterans Administration.....	61	(-)	Nevada.....	0	0
By age group served: ²			Nevada.....	26	20
Children and adults.....	750	261	New Hampshire.....	65	20
Children only.....	100	178	New Jersey.....		
Adults only.....	111	360	New Mexico.....	1	0
By State:			New York.....	330	1
Alabama.....	8	5	North Carolina.....	13	11
Arizona.....	1	2	North Dakota.....	1	1
Arkansas.....	1	2	Ohio.....	44	25
California.....	61	21	Oklahoma.....	4	1
Colorado.....	11	7	Oregon.....	12	6
Connecticut.....	35	31	Pennsylvania.....	65	24
Delaware.....	10	8	Rhode Island.....	10	7
District of Columbia.....	17	5	South Carolina.....	5	4
Florida.....	21	15	South Dakota.....	4	1
Georgia.....	9	0	Tennessee.....	5	5
Idaho.....	1	0	Texas.....	21	10
Illinois.....	71	20	Utah.....	5	4
Indiana.....	16	12	Vermont.....	6	6
Iowa.....	14	10	Virginia.....	24	18
Kansas.....	21	15	Washington.....	9	5
Kentucky.....	15	7	West Virginia.....	10	7
Louisiana.....	19	11	Wisconsin.....	22	11
Maine.....	8	6	Wyoming.....	0	0
Maryland.....	13	37	Alaska.....	3	3
Massachusetts.....	102	30	Hawaii.....	8	0
Michigan.....	51	28	Puerto Rico.....	2	1
			Virgin Islands.....	2	0

¹ Total number of clinics in each classification estimated

² Only selected data reported for the clinics of the Veterans Administration

³ Excludes 64 clinics of the Veterans Administration.
⁴ Reporting was initiated in New York State on January 1, 1958.

Table 3. Diagnostic status of patients for whom services were terminated in 488 outpatient psychiatric clinics, by age at admission, 1956¹

Age group (years)	Total number of patients	Percent of patients		
		With psychiatric disorder	With no psychiatric disorder	Undiagnosed
Total	86,740	73.7	4.1	22.2
Under 18	49,005	69.4	4.8	25.8
Under 5	5,507	43.9	15.1	41.1
5-9	18,262	69.9	4.2	26.0
10-13	14,278	74.1	2.6	23.3
14-17	10,958	75.3	3.6	21.0
18 and over	37,735	79.3	3.2	17.6
18-20	3,466	67.5	9.1	23.4
21-29	10,547	77.2	3.2	19.6
30-44	15,556	81.3	2.2	16.5
45-64	7,096	83.8	2.2	14.1
65 and over	1,070	78.0	4.1	17.9

¹ Of 499 reporting clinics, 11 did not provide information on diagnosis.

laterals (parents, spouses, or others) in the interest of a number of patients. In group sessions, one interview is counted for each patient or collateral present. An average of five persons were present at each group session.

About one-third of the reporting clinics held group sessions. Clinics serving only alcoholics reported the highest proportion (16 percent) of interviews in groups.

Diagnoses of Patients

At the time a case is closed, the psychiatric disorder of a clinic patient is reported according to classifications given in the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (10).

Prior to the initiation of nationwide reporting, a descriptive sentence or paragraph frequently was used in place of standard terms in recording a diagnosis, particularly of a child patient. A number of general and technical problems resulted from this transition. That is, differing opinion as to the usefulness of recording a single diagnostic term, difficulties in classifying some patients, particularly children, according to the diagnostic definitions, and a lack of uniform interpretation of definitions have been encountered (11).

Of the 135,000 patients on the rolls of reporting clinics during 1956, services were terminated for about 87,000. A psychiatric disorder was reported for 74 percent of these patients; the others either were found to be without psychiatric disorder (4 percent) or were not diagnosed (22 percent). Among children under 5 years of age, 15 percent were without psychiatric disorder and 41 percent were undiagnosed (table 3).

The undiagnosed include (a) patients who were ineligible for service and were referred elsewhere, (b) patients who withdrew before complete evaluation, (c) child patients who were not seen by the clinic staff but whose problems the parent discussed with the clinic staff, (d) patients who received psychological testing only, and (e) other patients who for one reason or another received counseling services without a psychiatric evaluation.

Among the 64,000 patients reported with a diagnosed psychiatric disorder, the diagnostic pattern varied markedly by age (table 4 and fig. 2). Data on diagnoses of clinic patients on termination of service do not reflect the extent or distribution of these illnesses in the community. Also information collected on patients at time of termination of service may not be representative of the characteristics of admitted patients or patients on the rolls at any one time.

The most frequent psychiatric disorder reported for children was "transient situational personality disorder" (see definitions on page 954). The relative frequency of this category decreased sharply by early adulthood.

"Mental deficiency," classified as familial or idiopathic, was also a frequent diagnosis (18 percent) for child patients, particularly for the very young. It accounted for one-third of the diagnoses reported for patients under 5 years of age. The proportion declined to 19 percent for patients of early school age and to less than 3 percent among adult patients. This pattern seems to agree with other findings suggesting that by the time a mental defective passes the age of scholastic demands, he tends to disappear from the problem noninstitutionalized population, possibly because he has been placed in institutional care or has made vocational or other adjustment (12).

markedly with similar age data for patients under care in mental institutions (fig. 1). For example, there were approximately three outpatients to each inpatient under 18 years of age and 1 outpatient to 50 inpatients 65 years of age and over.

Almost 300 males but only 176 females per 100,000 in the population were estimated as being clinic patients during 1955. The highest estimated number per 100,000 for boys, nearly 700, was in the age group 10 to 13 years; for girls, less than 400, among those 14 to 17 years. The higher proportion of boys than girls is typical of outpatient clinic caseloads. For adults, the estimated number of patients per 100,000 population was about 200 males and 140 females. About a third of the estimated number of adult male patients were those reported by the Veterans Administration clinics. Some child guidance clinics count parents as collaterals even when they receive clinic treatment on their own behalf. This practice results in some underestimate of the total num-

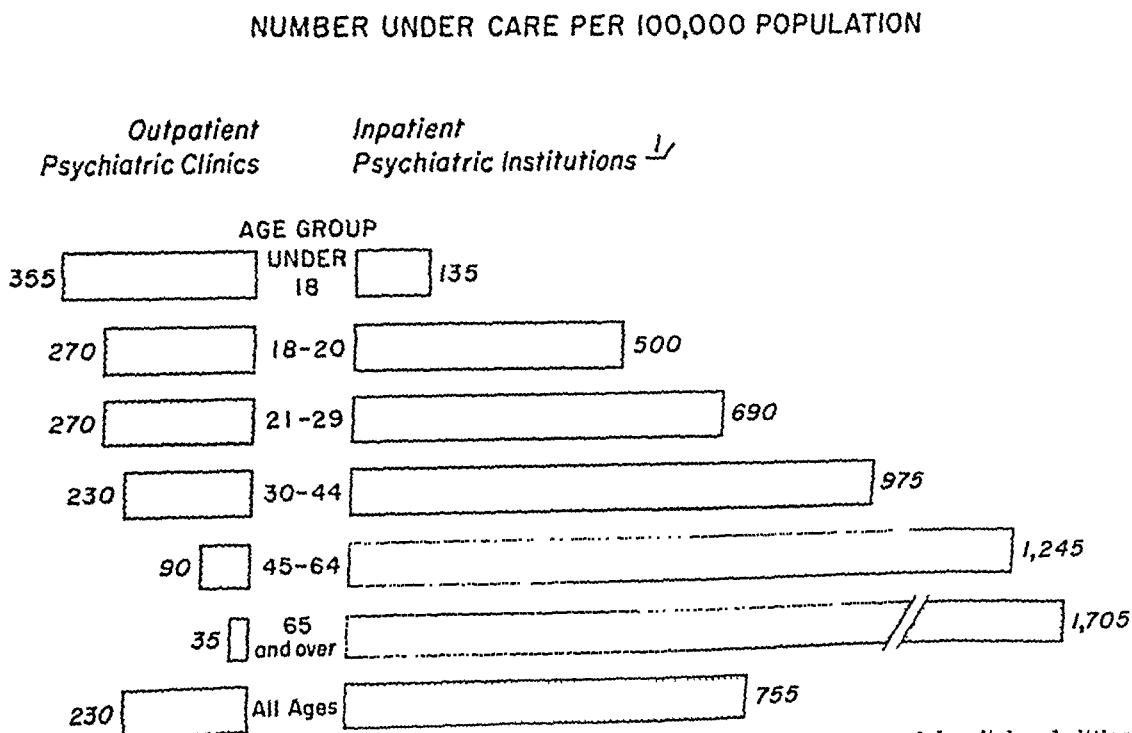
ber of emotionally disturbed adults, particularly for women since mothers are most frequently the collaterals treated by clinics.

Data for the 499 clinics reporting for the year 1956 indicate a rapid turnover of patients in these facilities. A total of 135,000 patients were served during the year. Of this total, 60 percent were newly admitted and 10 percent were readmitted after a previous experience in the same clinic. The remaining 30 percent had continued as patients from the preceding year.

Approximately 990,000 interviews were reported on behalf of the 135,000 clinic patients, an average (mean) of about 7 interviews per patient. Based on detailed information available for patients for whom services were terminated, the median number of interviews is estimated to be about three.

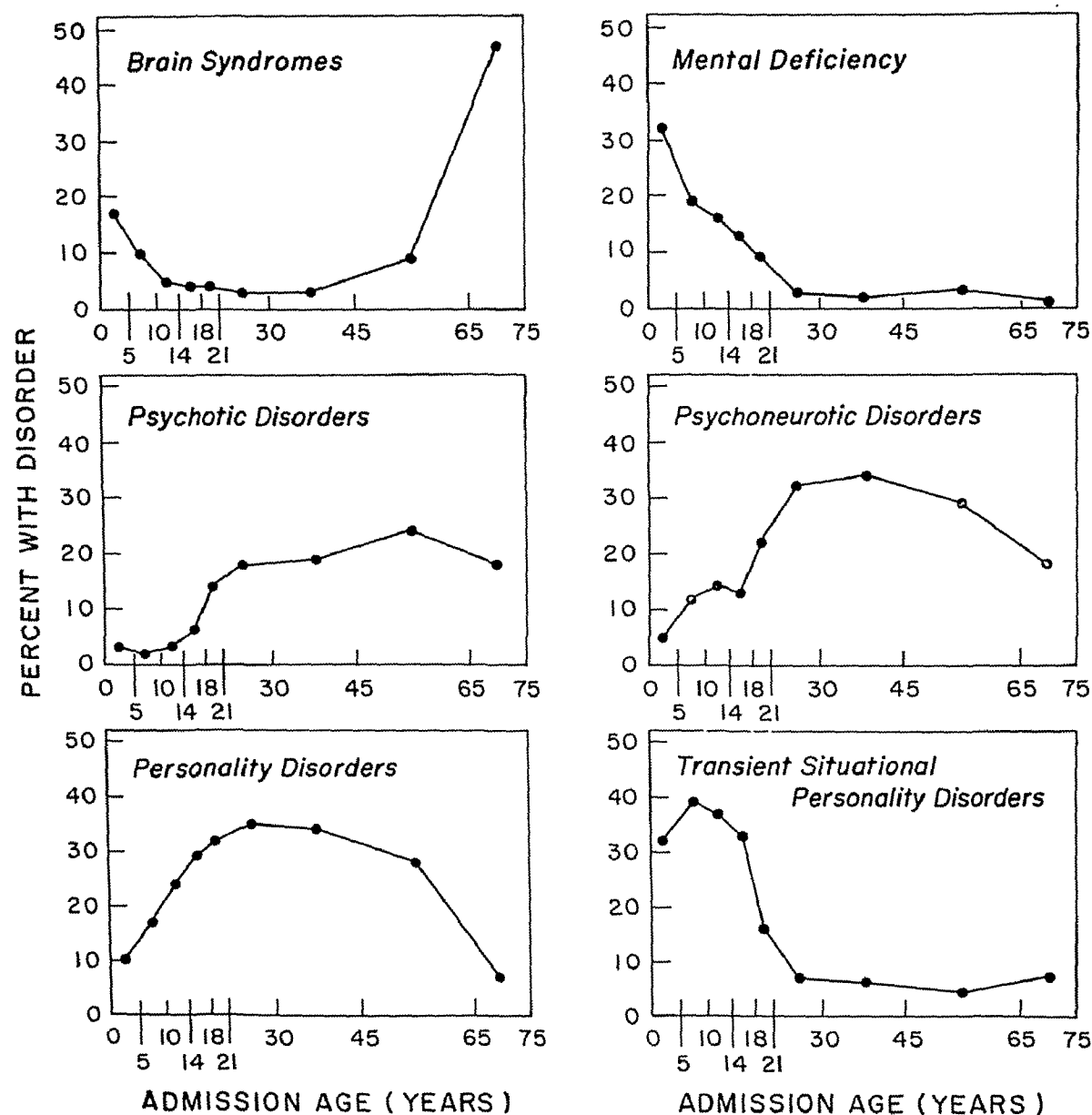
Nearly all of the interviews were individual meetings with the patients, their collaterals, or both. Only 5 percent (47,000 interviews) were held either in group psychotherapy sessions with the patient or in group work with col-

Figure 1. Estimated number of patients under care during the year in outpatient psychiatric clinics and inpatient psychiatric institutions per 100,000 population, continental United States, 1955



^{1/}Includes patients in public and private hospitals for the mentally ill, in general hospitals admitting psychiatric patients, and mental defectives in public and private institutions for mental defectives and epileptics.

Figure 2. Percentage distribution of mentally ill patients for whom services were terminated, by psychiatric disorder and by age group, 488 outpatient psychiatric clinics, 1956



from early childhood through the early adult years. They were only one-tenth of the diagnoses for preschool children, yet as many as one-third of the adults up to 45 years of age were so diagnosed. Among older adult patients these disorders were relatively less frequent. Addiction to alcohol (without recognizable underlying psychiatric disorder) represented about one-tenth of the reported diagnoses in ages 30-64 years. Patients with this

diagnosis were reported by 13 clinics serving alcoholics exclusively and by 161 other clinics. Drug addiction was much less frequently a primary diagnosis of clinic patients. Less than 1 percent of all adults reported were classified with this personality disorder. And drug addicts were identified by only 68 clinics.

"Psychoneurotic disorders" were reported for 13 percent of the child patients; the percentage was more than twice as high among all adults.

Table 4. Psychiatric disorder of patients with a diagnosed disorder for whom services were terminated, by age group, 488 outpatient psychiatric clinics, 1956

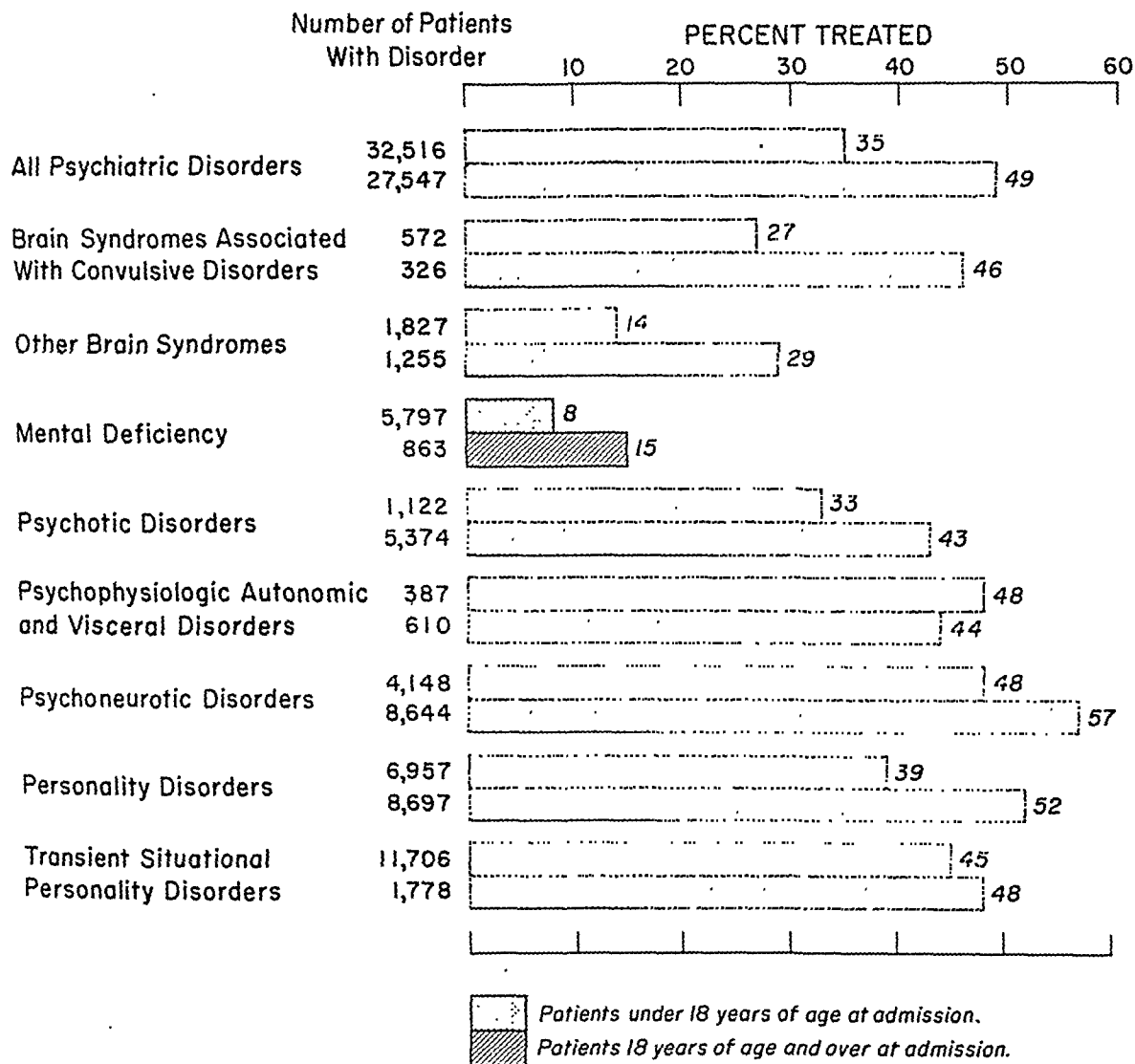
Psychiatric disorder	Total	Age group at admission (years)				
		Under 5	5-9	10-13	14-17	
<i>Patients under 18 years of age</i>						
Number of patients.....	34,009	2,415	12,762	10,576	8,256	
Percent with:						
Brain syndromes.....	7.4	16.6	9.6	5.4	4.0	
Associated with convulsive disorder.....	1.7	2.3	1.9	1.5	1.5	
All other.....	5.7	14.3	7.7	3.9	2.5	
Mental deficiency.....	17.6	32.3	19.3	15.8	13.1	
Psychotic disorders.....	3.5	2.7	2.4	3.0	6.1	
Psychophysiologic autonomic and visceral disorders.....	1.3	1.3	1.1	1.4	1.3	
Psychoneurotic disorders.....	12.6	4.8	12.4	14.3	13.2	
Personality disorders.....	21.3	10.0	16.5	23.5	29.0	
Transient situational personality disorders.....	36.3	32.3	38.8	36.7	33.2	
		18-20	21-29	30-44	45-64	65 and over
<i>Patients 18 years of age and over</i>						
Number of patients.....	29,907	2,340	8,140	12,649	5,943	835
Percent with:						
Brain syndromes.....	5.6	3.8	2.8	3.3	9.2	47.4
Associated with convulsive disorder.....	1.1	1.8	1.2	1.1	.9	.7
Associated with cerebral arteriosclerosis.....	1.5	0	0	.1	2.4	35.6
All other.....	3.0	2.0	1.6	2.1	5.9	11.1
Mental deficiency.....	2.9	8.9	2.9	2.1	2.7	.7
Psychotic disorders.....	19.5	14.1	18.1	19.2	24.1	18.2
Involutional psychotic reaction.....	1.7	0	0	.6	5.9	5.5
Affective reactions.....	2.6	.8	1.3	2.2	5.6	6.8
Schizophrenic reactions.....	13.8	12.9	16.0	14.9	10.6	2.4
Paranoid reactions.....	.9	.2	.5	1.0	1.3	1.5
Other.....	.5	.2	.3	.5	.7	2.0
Psychophysiologic autonomic and visceral disorders.....	2.3	2.6	2.0	2.5	2.5	1.6
Psychoneurotic disorders.....	30.9	21.8	32.1	33.5	29.4	18.1
Anxiety reactions.....	12.8	9.6	14.4	14.8	9.0	3.7
Depressive reactions.....	7.6	3.4	6.0	7.1	11.9	10.4
All other.....	10.5	8.8	11.7	11.6	8.5	4.0
Personality disorders.....	32.0	32.4	35.0	33.7	27.7	7.1
Alcoholism (addiction).....	8.1	.6	2.9	10.3	14.1	2.4
Drug addiction.....	.4	.2	.5	.4	.5	.3
All other.....	23.5	31.6	31.6	23.0	13.1	4.4
Transient situational personality disorders.....	6.7	16.4	7.1	5.7	4.4	6.9

"Brain disorders (acute and chronic)" also represented relatively frequent diagnoses for the very young patients (17 percent of those under 5 years of age). At these ages, such disorders are usually associated with prenatal etiology or birth trauma. These disorders were less frequently a diagnosis for child patients of school age. Only 10 percent of those in the early school years (5 to 9 years of age) and no more than 5 percent of the child patients 10 years of age and older were reported with a diagnosis of brain syndrome. Brain syn-

dromes were relatively infrequent as a diagnosis among adult patients except for the aged where, due primarily to cerebral arteriosclerosis and other degenerative changes, brain syndromes represented almost half of all disorders. Brain syndromes associated with convulsive disorders (idiopathic epilepsy) accounted for less than 3 percent of the diagnoses in all age groups.

In contrast with brain syndromes, "personality disorders" increased in relative frequency as a diagnosis with each successive age group

Figure 3. Percent of patients for whom services were terminated receiving treatment for psychiatric disorder, by diagnosis and age group, 468 outpatient psychiatric clinics, 1956



Less than one-fifth of the patients with mental deficiency or brain syndrome, excluding those associated with convulsive disorder, were treated in the clinic. One-third of the children and two-fifths of the adults with psychotic disorders were treated. Generally, one-half of the patients with other disorders were treated.

The amount of service a patient receives is indicated by the number of face-to-face interviews with the patient or with his family or with others, such as an agency worker on behalf of the patient. Length and quality of interviews are not measured. Interviews over the

telephone, case conferences, and a variety of other clinic activities in the interest of the patient are not counted.

For most patients, services were terminated after only a few interviews. More than one-fifth had only one interview and three-fifths had less than five; the median number of interviews was three (table 5). It is estimated that approximately one-half of all reported interviews on behalf of patients for whom services were terminated were interviews with the 8 percent who had 25 or more interviews.

Eighteen percent of the child cases and 28

One-third of the reported diagnoses for adult patients 21 to 44 years of age were in this category. The sharp increase in the relative frequency of this disorder reported for patients in early adulthood, interestingly, is approximately of the same magnitude as the decrease reported for transient situational personality disorders.

"Psychotic disorders" were relatively rare (4 percent) among children but accounted for one in five diagnoses for adult clinic patients. The greatest increase in relative frequency occurred in early adulthood. Schizophrenic reactions strongly predominated among psychotic patients less than 45 years of age. After this age, involutional psychotic reactions and affective (manic-depressive) reactions were increasingly important. Paranoid reactions were of minor numerical importance in all age groups.

Less than 3 percent of the diagnoses for each age group were "psychophysiologic autonomic and visceral disorders."

Clinic Service to Patients

The type and amount of service a clinic patient receives is determined by such factors as clinic policies, availability of clinic staff and other community resources, reasons for referral to the clinic, and patient and family cooperation, as well as diagnosis.

The type of service is classified at the time the case is closed into three principal categories: (a) diagnosis and treatment, (b) diagnosis only, and (c) other services only, including psychological testing only. "Other services only" in general include situations previously enumerated for patients reported as undiagnosed. "Diagnosis only" includes instances where diagnostic evaluation and interpretation have been completed but either the patient was sent elsewhere for treatment, he left before treatment was initiated, or treatment was not indicated. "Treatment" is considered to begin only after a diagnostic evaluation or determination of the problem and includes individual or group psychotherapy, counseling of parents, or other types of therapy provided by the psychiatrist, clinic psychologist, psychiatric social worker and other professionals. Patients reported "treated" may not have completed the prescribed treatment.

Of each 10 patients for whom service was terminated in the reporting clinics in 1956, on the average 3 had received both diagnostic and treatment services, 5 had received diagnostic evaluation but no treatment, and 2 had received only a partial psychiatric evaluation, application interview, referral, or other services (table 5). A larger proportion of adult patients than child patients received treatment (two-fifths of the adults and one-fourth of the children). To some extent this difference reflects the relatively high proportion of children undiagnosed. In addition, a larger proportion of child than adult patients were mentally deficient, a disorder often not treated in psychiatric clinics. For nearly every psychiatric disorder, however, the proportion treated is greater for adults than for children (fig. 3).

Table 5. Type and amount of outpatient psychiatric clinic service received by patients for whom service was terminated, by major age group, 1956¹

Service	Total	Under 18 years of age	18 years of age and over
<i>Type of service</i>			
Number of patients.....	89, 195	50, 571	38, 624
Percent receiving:			
Diagnosis and treatment.....	32.0	25.2	40.9
Diagnosis only.....	45.7	47.4	43.6
Other services only.....	22.2	27.4	15.5
<i>Interviews</i>			
Number of patients.....	88, 244	50, 219	38, 025
Percent with:			
1.....	22.5	18.1	28.4
2-4.....	36.7	36.3	37.2
5-9.....	20.6	24.0	16.0
10-24.....	11.9	12.1	11.6
25-49.....	5.1	5.6	4.4
50 or more.....	3.3	3.9	2.5
Median number of interviews.....	3	4	3
Number of interviews.....	719, 386	468, 965	250, 421
Percent with:			
Patient.....	65.3	51.9	90.3
Parent or parent substitute.....	28.6	42.4	2.8
Spouse.....	1.4	.1	3.9
Other significant person.....	4.7	5.6	3.1

¹ Type of service reported by 499 clinics; number of interviews, by 494 clinics; and interviews by person seen, by 453 clinics.

Table 7. Number of interviews with or about patients for whom service was terminated since latest admission, by major age group and psychiatric disorder, 220 outpatient psychiatric clinics, 1956

Psychiatric disorder	Total number of patients	Percentage distribution by number of interviews with or about patient						Median number of interviews
		1	2	3-4	5-9	10-24	25 or more	
Patients under 18 years of age.....	23, 292	16. 4	14. 4	21. 7	23. 5	13. 0	11. 1	4
Brain syndromes.....	1, 236	5. 0	10. 9	28. 1	35. 2	13. 6	7. 1	5
Mental deficiency.....	2, 727	10. 7	20. 7	33. 5	25. 8	6. 5	2. 9	3
Psychotic disorders.....	608	4. 6	10. 0	21. 1	29. 7	17. 8	16. 8	6
Psychophysiologic autonomic and visceral disorders.....	190	5. 8	5. 8	21. 1	28. 4	22. 6	16. 3	6
Psychoneurotic disorders.....	2, 170	3. 6	4. 8	18. 5	26. 8	19. 8	26. 5	8
Personality disorders.....	3, 105	5. 3	8. 1	21. 0	31. 4	16. 8	17. 4	6
Transient disorder.....	6, 557	4. 3	9. 6	19. 9	28. 7	20. 4	17. 0	7
No psychi.....	1, 187	20. 6	31. 2	29. 4	13. 6	4. 4	. 8	2
Undiagnosed.....	5, 512	48. 1	22. 2	16. 9	8. 9	3. 2	. 6	2
Patients 18 years of age and over.....	17, 758	26. 4	19. 6	17. 6	15. 4	12. 6	8. 3	3
Brain syndromes:								
Associated with cerebral arteriosclerosis.....	216	40. 7	25. 5	17. 6	8. 8	6. 5	. 9	2
All other.....	600	27. 2	25. 0	20. 3	14. 2	8. 3	5. 0	2
Mental deficiency.....	394	29. 4	24. 6	23. 4	17. 0	3. 3	2. 3	2
Psychotic disorders.....	2, 703	21. 5	20. 6	21. 0	18. 9	11. 2	6. 8	3
Psychophysiologic autonomic and visceral disorders.....	270	25. 9	18. 1	17. 4	8. 5	20. 7	9. 3	3
Psychoneurotic disorders.....	4, 665	18. 8	15. 9	17. 5	17. 1	17. 9	12. 8	4
Personality disorders:								
Alcoholism (addiction).....	1, 003	21. 1	19. 8	18. 4	20. 8	13. 3	6. 5	3
All other.....	3, 699	15. 5	18. 1	18. 5	17. 3	17. 2	13. 4	4
Transient situational personality disorder.....	878	20. 5	20. 0	18. 6	20. 6	13. 9	6. 4	3
No psychiatric disorder found.....	318	40. 6	23. 9	17. 9	11. 3	5. 7	. 6	2
Undiagnosed.....	3, 012	56. 1	23. 8	11. 9	5. 6	2. 1	. 3	1

Objective criteria for classifying and validating change in the degree of impairment are needed to evaluate adequately the outcome of treatment.

Discussion

Data available for 1955 and 1956 on about 500 mental health clinics located in almost every State provide a basis for estimating the total number of clinic patients in the United States by age and sex, and for describing the psychiatric disorders of patients and services performed. Patterns of experience evident from the limited data provide a starting point for assessing outpatient mental health services.

While the data suggest some preliminary answers to questions on the patients served by mental health clinics and the services received, they also raise pertinent questions for research. Some relate to general areas of investigation presently underway and others to possible new areas.

First, more comprehensive clinic reporting is needed for a national analysis of clinic patient characteristics and services. It would also permit comparisons between States and between types of clinics, such as child guidance clinics and clinics serving both children and adults, clinics in rural health departments, and those in university medical centers. Observed differences still may be difficult to interpret, however, because of wide variation in available facilities, purpose, orientation, policies, and practices.

The nationwide clinic reporting program collects only summary data from each clinic and is necessarily limited in scope. Information recorded on mechanical tabulating cards for individual patients has been made available for national use on about 100,000 patients for whom services were terminated in 1957. These cards contain additional information on referral source, reasons for termination, recommended disposition, and fact of previous clinic admis-

percent of the adult cases were closed after one interview. About one-fifth of the patients in both age groups had 10 or more interviews. Only slightly more than one-half of all interviews reported for children were interviews with the patients; 42 percent were with a parent and 6 percent were with another significant person such as a welfare or social agency worker seen on the child's behalf. Ninety percent of the interviews reported for adults were with the patient himself (table 5).

The number of interviews is related to the type of service received. Special tabulations, provided by more than 220 of the 499 reporting clinics, indicate a median of 12 interviews for treated patients, while for those receiving diagnostic evaluation, usually with interpretation and referral service, the median was 3 interviews. The median number of interviews for both diagnostic and treatment services was about twice as high for child as for adult patients (table 6).

Child and adult patients with brain syndromes or mental deficiency had a pattern of receiving fewer interviews than those with a nonorganic disorder. The largest number of interviews per patient was reported on behalf of children with a psychoneurotic disorder (table 7). A large proportion of child patients, as many as 20 percent of those under 5 years of age, received psychological testing only, primarily for adoption, home, or school placement. More than 70 percent of these pa-

tients had only one or two interviews. Relatively few patients 65 years of age and over were treated and most received only a few interviews.

Data are collected routinely as to whether the patient is improved or unimproved or worse after treatment, based simply upon the best judgment of the therapist or clinic staff. Any gain in the patient's condition at termination as compared with admission is considered improvement; the improvement may be not only in mental state, symptoms, or social adjustment, but also in the environmental or familial situation.

Three-fourths of 11,300 child patients, and two-thirds of 13,600 adults for whom results of treatment were reported upon termination, were classified as improved according to this definition. The proportion improved was highest among patients with those disorders most frequently treated. Between 45 and 55 percent of patients with brain syndromes, mental deficiency, psychotic disorders, alcoholism, and drug addiction were reported as improved. Among patients with other disorders, all of psychogenic origin, between 70 and 80 percent improved. In most diagnostic groups, more favorable results from treatment were reported for children than for adults, but the differences were not marked and may reflect in part differences in the types and severity of illness for the two age groups and possibly also differences in the criteria used by the staff.

Table 6. Number of interviews with or about patients for whom service was terminated since latest admission, by type of service and major age group, 227 outpatient psychiatric clinics, 1956

Type of service	Total number of patients	Percentage distribution by number of interviews with or about patient						Median number of interviews
		1	2	3-4	5-9	10-24	25 or more	
<i>Patients under 18 years of age</i>								
Diagnosis and treatment	6,573	1.3	2.4	6.4	20.6	32.4	37.0	17
Diagnosis only	11,162	8.8	16.3	32.9	33.3	7.3	1.3	4
Other services only	5,777	47.8	24.5	17.3	7.7	2.3	.4	2
<i>Patients 18 years of age and over</i>								
Diagnosis and treatment	7,679	5.2	8.4	15.6	25.1	26.6	19.1	8
Diagnosis only	7,488	36.6	29.9	21.8	9.1	2.3	.2	2
Other services only	2,704	57.7	22.9	11.5	5.6	2.0	.3	1

patients reported as undiagnosed at the time service was terminated also poses a number of questions in methodology and analysis.

Clinic admission rates, services received, and results after treatment are probably related to such demographic and familial characteristics as marital status, education, occupation, and type and size of family—all items of information not collected annually in the nationwide reporting program. A special study of such possible correlates is being considered in limited geographic areas for 1960.

Followup of patients after clinic discharge is needed to answer such questions as: What is the subsequent history of the individual discharged after treatment? How many patients seen for only a few interviews are adequately helped? What proportion of these patients follow clinic recommendations?

Lastly, though representing one of the foremost problems, epidemiological information for clinics alone may be misleading. The patient population is the result of many selective factors and its relation to the total mentally ill population is unknown. The collation of data from the various psychiatric facilities in a community or State, however, can provide important baseline information on the total number of medically recognized mentally ill.

Summary

Based on reports about patients submitted by approximately two-fifths of the outpatient psychiatric clinics, it was estimated that 379,000 individuals in the United States, about 197,000 children and 182,000 adults, were clinic patients during 1955.

The estimated number of patients per 100,000 population was higher for children than adults, and higher for males than females at all ages.

Of the child patients with a diagnosed disorder for whom services were terminated by reporting clinics in 1956, one-third were reported with transient situational personality disorder. Personality disorders and mental deficiency also were frequently diagnosed. Adult clinic patients usually were reported with a personality or psychoneurotic disorder although psychotic disorders were not infrequent.

Of each 10 patients for whom services were

terminated, on the average 3 had received treatment after diagnosis, 5 had received diagnostic evaluation but were not treated, and 2 had received only an application interview, partial evaluation, referral, or other similar service.

Relatively short-term service was reported for many clinic patients. More than one-fifth of the patients whose clinic service was terminated in 1956 had received only one interview and three-fifths, less than five.

At termination of clinic services, a median of 12 interviews was reported for patients who had been treated, and a median of 3 for those who had received a psychiatric evaluation only. Patients with brain syndromes and mental deficiency received fewer interviews than those with nonorganic disorders.

The median number of interviews for children was four; for adults, three. More than one-half the interviews reported for child patients were with the child, 42 percent were with the child's parent, and 6 percent were with another significant person such as a social welfare agency worker seen on the child's behalf. Ninety percent of the interviews reported for the adult patient were with the patient himself.

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DEFINITIONS OF MENTAL DISORDERS

DISORDERS CAUSED BY OR ASSOCIATED WITH IMPAIRMENT OF BRAIN TISSUE FUNCTION

Brain Disorders (acute and chronic). Organic brain syndromes characterized by diffuse impairment of brain tissue function (orientation, memory, intellectual functions, judgment, affect). Psychotic or neurotic manifestations or behavioral disturbances may be superimposed. Significantly disturbed intellectual development may also be superimposed if brain disorders are present during infancy and childhood.

MENTAL DEFICIENCY

Mental Deficiency. Defect of intelligence existing since birth without demonstrated organic brain disease or known prenatal cause (formerly familial or "idiopathic" mental deficiency).

DISORDERS OF PSYCHOCENIC ORIGIN OR WITHOUT CLEARLY DEFINED PHYSICAL CAUSE OR STRUCTURAL CHANGE IN THE BRAIN

Psychotic Disorders. Disorders characterized by a varying degree of personality disintegration and failure to test and evaluate correctly external reality.

Psychophysiologic Autonomic and Visceral Dis-

orders. Reactions representing the visceral expression of affect. Such exaggerated long-continued visceral states may eventually lead to structural changes. (Includes diagnoses formerly called "psychosomatic disorders" or "organ neuroses.")

Psychoneurotic Disorders. Disorders characterized chiefly by "anxiety" which may be directly felt and expressed or which may be unconsciously and automatically controlled by the utilization of various psychological defense mechanisms.

Personality Disorders. Disorders characterized by developmental defects or pathological trends in the personality structure, with minimal subjective anxiety and little or no sense of distress. In most instances, the disorder is manifested by a lifelong pattern of action or behavior, rather than by mental or emotional symptoms.

Transient Situational Personality Disorders. Reactions which are more or less transient in character and which appear to be an acute symptom response to a situation without apparent underlying personality disturbance. Includes transient symptomatic reactions of children to some immediate situation or internal emotional conflict.

sions. Thus they should provide answers to many questions on characteristics of patients and services received.

For appropriate interpretation of data on clinic patients, admission rates by age, sex, and psychiatric disorder are needed. The need to relate clinic caseloads to population is illustrated in table 2. For example, because of the estimated relatively large number of patients in each year of age in the 5 to 9 group, it would appear that children of early school age have a somewhat greater risk of referral to clinics than other children. However, because of the relatively large number of children 5 to 9 years old in the general population, the clinic caseload per 100,000 population is actually lower for this age group than for the older children. Reporting by all clinics serving a geographic area is a prerequisite for such studies.

As an aid in interpretation of the data, fur-

ther information should be collected on the admission and service policies of each clinic. Services to patients in clinics organized solely for diagnosis of court cases, for example, will differ from clinics where therapy is a planned objective.

Field studies, professional workshops, and other efforts are needed to improve uniformity of definitions and their interpretation and to insure the quality and reliability of the data. In particular, considerably more work is required at all levels on the diagnostic classifications of child patients.

Further work is also necessary on methodology of reporting. For example, as a first step in this new reporting program, detailed information on patients is collected at the time of termination of services and little information is reported at admission. The bias resulting from this method requires study. The lack of a psychiatric description for 22 percent of the

The opportunity to observe every environmental aspect of a patient's life is afforded the staff of a mental health clinic located within a settlement house serving a large community in New York City.

A Settlement House Approach to Community Mental Health

ANNE LAMBERT, M.S., MARGARET S. MAHLER, M.D.,
and VIRGINIA M. MOORE, M.D.

A PSYCHIATRIC clinic, known as the Hudson Guild Counseling Service, offering diagnostic and treatment service to children, adolescents, and their parents, individually and in groups, is operated by the Hudson Guild, a settlement house in New York City. This psychiatric clinic is not part of a hospital. It is a special division of the Hudson Guild's community service, which carries also a day-care and nursery program (ages 3 to 6), and a group work program for school-age children (both preteens and teenagers) and adults. It is a community service established with the objective of meeting the mental health needs of a neighborhood composed primarily of residents of a low-income housing project. Sixty-six percent of the tenants are Negroes or Puerto Ricans.

The following factors led to the establishment of the Hudson Guild Counseling Service:

1. The growing complexity of mental health needs in a rapidly changing, multiracial neighborhood and the resulting increases in demands on the settlement house staff.

2. The special demands for help with mental

health problems of children, stressed by the 608 families of young veterans who moved into the newly opened John Elliott Housing Project in 1947.

3. The strategic position of the settlement house, making the service readily accessible and usable by the community.

Ordinarily psychoanalysis and psychotherapy are accessible mainly to middle-class or high-income families. In facing the need of members of our families for psychotherapy, we were also faced with the need for seeking new ways and means of providing it. A concerted effort of various agencies in and around the settlement under the guidance of the counseling service seemed to be the logical approach.

Sponsorship and Staffing

The initial project, licensed by the State as a psychiatric clinic in 1951, was sponsored in its beginning year by the Hudson Guild alone. In the following years until 1955, the counseling service was sponsored jointly by the settlement house and the New York State Committee for Mental Health. Since 1955, the New York City Mental Health Board has become the secondary sponsor.

When the counseling service opened in October 1948, funds available were sufficient to

Miss Lambert, before her death in August 1958, was a psychiatric caseworker and director of the Hudson Guild mental health clinic. Dr. Mahler and Dr. Moore are psychiatrists on the clinic staff.

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National Science Foundation Fellowships

The National Science Foundation is accepting applications for fellowships for advanced study in the physical and social sciences. The deadline for applications is January 1, 1960, and the final selection of fellows will be announced March 15, 1960.

Fellowships will be awarded in the following fields: the mathematical, physical, medical, biological, and engineering sciences, anthropology, psychology (excluding clinical psychology), geography, mathematical economics, econometrics, demography, information and communication theory, experimental and quantitative sociology, history and philosophy of science, and interdisciplinary fields.

Fellows will be selected on the basis of ability, and applicants are required to take the graduate record examination.

Annual stipends vary from \$1,800 for those entering or with less than 1 year of graduate study to \$2,200 for those beginning the final year of training for the doctoral degree. Dependency allowances of \$500 per year for a spouse and for each dependent child are normally available. Tuition, laboratory fees, and limited travel allowances are also provided.

Applications and further information may be obtained from the Fellowship Office, National Academy of Sciences-National Research Council, 2101 Constitution Avenue, Washington 25, D.C.

The teaching is also aimed at developing more understanding of deviational behavior and its causes.

These seminars are conducted with the active participation of all members. Reports are given on individual cases or group activities, assignments of appropriate reading material are discussed, and the like, but the seminars are aimed at synthesization of general knowledge with the facts given on individuals and groups.

We believe that the following professional groups could benefit from training placement in such a service: psychiatric caseworkers interested in work with children and parent-child relationships; students of social organization seeking to obtain an understanding of interaction between personality factors and social conditions; group work students, who may become sensitized to the personality structure of the individual and so acquire a special skill in doing group work in a psychiatric setting; and psychiatrists who seek training in the community aspects of mental health.

The Caseload

The primary objective of the counseling service has been to meet the mental health needs of children and adolescents. This objective was the determining factor in evaluating the caseload of the clinic. We established the following policy.

All requests or self-referrals for mental health services are given attention to the extent that the problem at referral is diagnostically understood. If the problem falls beyond the scope of the clinic, a referral to an appropriate resource in the community is made. In making such a referral, care is taken to prepare the person and the agency for the contact.

Collaboration between the counseling service and agencies referring cases, especially the children's center and the group work department of the Hudson Guild, starts at the point of referral and continues through diagnostic study and treatment. The collaboration takes the form of interdepartmental conferences. At the initial conference, the basis for the referral is discussed; reports are obtained from the nursery and public school teachers, and from group workers; observational and informa-

tional material on the family acquired from participation in the settlement house program is developed and is extremely valuable in reaching a decision on acceptance and further disposition of the case.

Several questions arise. How much can really be done in cases of severe disturbances? Is the effort to help commensurate with the results? Is a mental health service needed for lesser problems? Our experience has shown that no matter how much or how little is done, it should be done with awareness of what is being done and what is left undone. To get this clear awareness, a solid diagnostic study is very much indicated—not for the purpose of labeling but for the purpose of understanding the degree of pathology, the presence of positive strengths, and the interrelation of those strengths within the individual and the family. It is for this reason that we consider one of the functions of a community mental health service in a setting such as ours is to arrive at a diagnostic understanding of the problem referred in the intake study, even in cases which are then referred to other resources, possibly in another community.

Our intake policy has been to carry out the diagnostic study as soon as possible, establishing priority for acceptance on the basis of the results. The wealth of authentic, factual information available to us through the physical location of the clinic within the settlement house, with its close-knit ties to community life, plus the extensive diagnostic study, permits us to differentiate the further disposition of the case as follows:

1. In cases where children can be helped while remaining in their groups, guidance of the nursery teachers or group workers and treatment of the parents is given by the clinic.
2. Adolescents, in need of treatment but not ready for it, are worked with by our group leaders under the guidance of the counseling service, in preparation for a contact with the clinic.
3. Children in need of individual treatment and parents in need of a treatment contact in relation to their children's problems comprise the bulk of the clinic's caseload. It is for these children that frequently a multifaceted treatment is set up.

hire one full-time caseworker, one part-time psychiatrist and one part-time secretary. At present, it has a staff of three part-time psychiatrists, two part-time psychologists, two full-time and four part-time caseworkers, one group therapist, one group therapy consultant, and five psychiatric casework students.

The medical director of the counseling service is one of the psychiatrists. He is also supervising psychiatrist and the diagnostician for adolescents and adults. The second psychiatrist is the clinic's chief consultant for the pre-school child. The third psychiatrist diagnoses school-age children, leads initial team conferences, and treats some children.

The counseling service director and case supervisor is a psychiatric caseworker. She is also in charge of the training program for psychiatric social workers as well as the coordinator of the special projects sponsored by the service.

In developing the staffing pattern, we considered it essential to have psychiatric caseworkers professionally well qualified, capable of using supervision constructively, and interested in working in the community. It was found most economical (and not only in the budgetary sense) to use competent psychiatrists according to their area of specialization. In selecting psychologists, we looked for ability in testing and additional training in therapy. These staff qualifications permit us to use representatives of all three professions in treatment, the psychologists and caseworkers working under a psychiatrist's supervision.

The supervising psychiatrist (medical director) maintains a constant inservice training program for the staff. Actually, the psychiatrist supervises the treatment in individual conference with the caseworker. At intervals, case review conferences are held at which the case supervisor is present as well as all workers active with the family. It is at these conferences that the community aspects as well as the general treatment policies of the clinic are considered.

Difficulties with the untrained workers who comprised the staff of the group work department—the social service area related to group activities of school-age children and adults—arose at the inception of the counseling service.

These difficulties were related to the staff's unwarranted apprehension that the ability of a counseling service worker to help a child who displays behavioral deviations within the group would, by implication, undermine the professional status of the group worker. There were other thoughts and apprehensions as well.

These difficulties resulted in a turnover in this department's staff, replacing untrained workers with trained.

It was a much slower process, however, to develop understanding of the counseling service, even with a trained staff. In view of these complexities, special emphasis was placed on clarification of the role of the counseling service within the setting of the settlement house.

Stimulation of understanding within the group work department was aided through placement of students from the New York School of Social Work, bearers of the professional approach, within the framework of the department as professional working observers. The trained workers on the staff of the group work department are fully occupied with their administrative functions. The actual work with the groups is carried on by volunteers and part-time workers giving limited time. Thus the students are the only workers with the time and interest to concentrate on their groups, eager as they are to intensify their training through a liaison contact with the counseling service.

In the last 2 years, the counseling service has supervised group work students on special assignment, with emphasis on psychiatric orientation.

Since 1955, the State Committee for Mental Health has been sponsoring an enlarged training program for psychiatric social workers. A small number of these in-training workers have been placed with the counseling service since January 1949.

In addition to training programs for the counseling service staff itself, seminars with staff workers from the other departments of the Hudson Guild are held frequently. At these seminars, the work of the counseling service is explained and factual knowledge conveyed about children in different ages and stages of development (biological, social, emotional, structural, and behavioral differences).

2. The evaluation of the child's problem in the intrafamilial psychopathology, and of the role of the deviant child in cementing the intrafamilial pathological emotional balance.

3. The combining of a nursery of good educational standing with a good clinic staff.

At the opening of the counseling service in 1948, there had been a teaching and working contact of 3 years' duration between the day nursery, called the children's center, and the psychiatric caseworker who became director of the service. Thus the establishment of the counseling service presented an opportunity to expand and deepen the contact. From the very beginning, the collaboration was focused on improving the diagnostic methods, intensification of efforts to improve timing of referrals, and closer and more intensive work with the children referred.

Other factors contributed toward the productivity of this collaboration. The children's center was adequately staffed quantitatively and qualitatively. The general educational level of the nursery program was high. The nursery teachers and parents of the younger children were willing to work toward better understanding and handling of the children.

In view of these contributing factors, the counseling service has been able to carry the basic program with the children's center and also to launch small study projects. A study of 6-year-olds and a study of early "runners-away" are examples. These projects have culminated in the demonstration project, the therapeutic nursery group for 4- to 5-year-olds.

The idea of the pilot project arose when we realized that the most intensive and extensive outbreak of difficulties occurred in the whole group aged 4 years. The nursery staff at times felt that the whole group should be referred to the counseling service. This particular phenomenon, understandable in the given developmental stage, led to the idea of trying out the medium of group therapy for those children referred to the service. This project is in its second year. A third year will be necessary in order to arrive at more definite conclusions.

So far, the experience of the first year has shown that children of this age do respond to modified activity group therapy. All children in this therapeutic group have shown progress

and improvement in varying degrees, corresponding to the severity of their difficulties. The children whose deviations were reactions to family attitudes and environmental conditions, have "blossomed" in response to their therapist's handling and to a better understanding by their parents. These children also have been able to function differently in the large nursery group from which they were originally taken to the therapy group. Children with more severe disturbances have shown improvement in their adjustment and relationships to age-mates although their basic disturbances remain.

Under the guidance of our psychiatrist for this age group, we have been able to achieve positive results in the majority of cases in correction of deviational behavior and of developmental growth problems and in strengthening emotional stability.

Positive results have been achieved with parents of younger children in the integration of changed attitudes. Individual contact with the parents has been a part of our study and treatment plan for the child. With most of the preschool children, the contact with the parent (usually the mother) developed into a treatment contact aimed at assimilation of new attitudes toward the child, in accordance with the child's needs and with the parent's capacity to meet them.

Frequently the treatment was focused on the parent's own problems which had led to the difficulty between the parent and child. Where the parent showed a certain degree of self-awareness and insight into the child's difficulty, the contact amounted to counseling. In cases of very disturbed parents, a supportive contact with the parent aimed at forestalling further damage was maintained.

Close collaboration between the counseling service and the children's center has proved invaluable in many ways, particularly in early detection of children's difficulties. Where the deviation was not severe but presented rather a developmental difficulty typical for the given age, it could be helped and would result in a developmental "spurt" of the child. When the difficulty was severe, a thorough diagnostic study enabled us to do "right" from the very beginning. This made it possible to lessen the

Our work with parents in groups started almost with the opening of the service. At first, the group work was educational. It gradually changed into "emotional reeducation."

At present the caseload amounts to 125 cases each month. Primarily, children accepted for treatment have behavioral and personality development problems and impulsive and compulsive neurotic character disorders. There are some borderline cases and problems of parent-child relationship. This means intake and diagnostic studies, individual treatment, and group therapy.

A series of "hardcore" families were referred to our service by the housing authority in December 1956. We started our work with these families with a psychiatric evaluation of the pathology and of the healthy potential of the family unit. We believed this would help us avoid hit-or-miss attempts to clarify what could be done and to concentrate our efforts within the realm of possible achievement. Our main goal was to give appropriate support to these deprived, damaged, and disturbed parents to an extent that would permit us to help the children. Although a grant for this project (which we planned to carry out as a research-in-action project) was not available to support our work with these families, there have been some positive results.

In addition, the clinic has a discussion group for mothers of children 3 to 5 and a therapeutic nursery group for children 4 to 5 years of age. The therapeutic nursery group is a pilot demonstration project under the sponsorship of the New York State Commission on Mental Health.

The caseload consists of 70 percent children and adolescents and 30 percent parents in treatment, and counted as separate cases. In a sizable number of families, more than two members are under treatment.

A constant factor is the waiting list and the large number of cases studied, accepted, but not yet assigned.

Group Work

The group work department of the settlement house conducts the social, educational, and recreational group activities for adults and children. There is no mental health emphasis

as such, but the activities are designed to contribute to the community's mental and social health.

The staff is composed of a graduate social worker, who acts as department supervisor, and five full-time associates, some with degrees in the social sciences and others with advanced training. In any one year, approximately 30 other individuals lead group activities for the Hudson Guild as volunteers or part-time paid workers. In addition, from one to five graduate students from schools of social work in New York City are assigned to the staff as field work placements. All volunteers and part-time workers are skilled in an activity such as handicrafts, dramatics, or dancing.

Group workers are encouraged to request consultation with the counseling service staff whenever they feel they need help in understanding the behavior pattern of a member of their group. When such a request is received, the group worker and a counseling service worker discuss the person and decide whether a formal referral to the clinic is indicated. If it is decided that such a referral is required, the group worker prepares a written report describing the person, his problem, family situation, and his potential acceptance of counseling.

The clinic established this procedure to encourage the group workers to "think through" the help the person needs and is ready to accept. An attempt has been made to avoid either impulsive or inordinately delayed referrals or building barriers to referrals.

From the beginning of the counseling service, the children's center has been the main source of referrals. During the past year, however, there were a large number of teenage referrals from the group work department, and the number of referrals from other Hudson Guild departments has steadily increased.

The Preschool Child

We feel that the specific value of our work with the nursery child lies in:

1. The early detection of deviational behavior (gauged, as it were, by comparison with the normal range of behavior of the identical age group in question).

belongs and that it belongs to him. In other words, he feels that he has a real and personal place in this neighborhood social unit with which he soon becomes highly identified. Therefore, whatever the clinic sets up for him in situ psychotherapy, special group experiences, and treatment contacts with his parents become joined for the child as concrete evidence of his personal importance and place in a specific structuralized social unit—the settlement house.

Everyone needs a sense of possessing positive social significance, but no one needs this more than the severely damaged child whose self-identity requires strengthening. The increasing development of positive object relationships, with their concomitant stimulation of ego development, requires satisfying experiences. When the school-age child achieves gratifying relationships with the individual staff members of the counseling service, to whom he is in reality important as a warmly valued human being, he is concomitantly feeling that he has positive meaning in the wider social context of the community center itself. This serves to reinforce the constructive aspects of his total experience in relation to the Hudson Guild.

It is interesting and significant to see the functioning of these severely damaged children change in response to such a multifaceted treatment plan. Typical of such children is Billy.

At the age of 4 years Billy was placed in the nursery by his mother. His nursery teacher described him as follows: "Billy has a downcast, sad expression on his face, but laughs a gurgling, baby laugh when played with individually. His relation to adults is complicated. He is quite dependent and wants a lot of exclusive attention. He accepts affection hungrily but does not ask for it. When picked up, he just seems to melt into one's shoulders. He is responsive to firmness but bewildered by choices. He is not ready for group activities but resents being left out. When the group is together, he throws himself on the floor with his eyes closed." His relation to other children was further described by his teacher as extremely hostile. "He hits, pushes, pounces on children, pulls their hair or pretty nearly chokes them without apparent reason. He often brushes his

hand in front of his face as though to dispel unpleasantness and trouble."

Billy's disturbed behavior at the age of 4 was rooted in developmental traumata which left him with a great deal of anxiety. Billy is now 9. From the age of 4 until the present, the clinic has been in contact with Billy and his mother. Billy has been given the multifaceted treatment plan in situ, which has included psychotherapy and also therapeutic types of group experiences. He is now in the fourth grade of school. He has done good school work since the first grade and was described by his last teacher as concentrating well upon school work and progressing in each subject. He "participates in classroom discussion, does beautiful art and clay work. He continues to make friends and is popular."

In the last 2 years, Billy has, without regression, met the birth of a third sibling and situational stress at home set up by acute marital discord and increase in his father's alcoholism. He has maintained an obsessive-compulsive line of defense against regression. He feels that he has both peer age and adult friends. He can increasingly express his conflicts and feelings in psychotherapy, and he has developed a far more secure relationship to his mother, who has also been in treatment contact with the clinic. He is still a particularly vulnerable child with ego weaknesses disclosed clearly in his Rorschach, but his functioning has improved tremendously. He can now enjoy social contacts, visualizes himself as having a future, and has achieved modes of mastery and sublimation which are social modes.

It is reasonable to assume that without the early establishment of a treatment plan which anticipated continuing, long-term contact, this severely damaged child would not have ceased to be such a behavior problem in groups where he had become a menace to other children. Neither would he have developed as well his capacity for academic achievement and for finding gratifying and socially acceptable outlets for his fantasy life.

Billy is only one of many children who have been highly deprived in this oral period and whose maturation continues to be uneven because of continued traumatic experience before the age of 4. Children of this type need com-

disturbance or arrest it. Such a lessening of the disturbance would improve the adjustment and functioning of the child at a given period, which had a therapeutic value as well. These children frequently still need therapy at a later point, but they enter therapy with a better prognosis. In a few cases our first contact with a severely disturbed child was at nursery age, and such a child, returning to our clinic in the early teens, benefited from the treatment contact.

The School-Age Child

In the school-age group of children referred to the counseling service, not a few have suffered severe traumata in infancy and early childhood, reflected in ego weakness expressed symptomatically in their behavior and functioning. These children will not respond to relatively short-term treatment. Less damaged and less vulnerable children, when assisted in reducing an immediate phasic anxiety, frequently respond with a developmental spurt which consolidates treatment gains sufficiently for them to make satisfactory adjustment without further clinic help. The severely traumatized school-age child does not possess as much basic ego strength to build upon. Therefore, a proper treatment plan for such a child must anticipate long-term contact which will continue to provide constructive, anxiety-diminishing types of help over a period of years.

Psychiatric treatment is of enormous value and definitely indicated. An adequate treatment plan for these particularly vulnerable children must include, however, more than direct psychotherapy, as the therapist possesses no magic which can provide other kinds of therapeutic experience equally important to such children. A severely damaged child may make increasingly secure contact with his therapist, but the gulf between this contact and the therapeutic vacuum to which he returns outside the clinic can be a gulf too wide for psychotherapy alone to bridge. Mobilization of therapeutic potential requires extension of treatment planning to include usual aspects of the severely damaged child's life, not only inside but outside his home.

In this regard, the very position of a psy-

chiatric clinic in a neighborhood settlement house makes a multifaceted treatment plan, extending constructively into various channels of the child's usual life, easier to achieve in a well-integrated, closely knit fashion.

Since the number of such children is large and the need great, it is highly pertinent to consider what community treatment resources can be developed for them. In this regard, a clinic in a neighborhood settlement house lends itself to becoming such a community treatment resource.

The clinic, through its position, is readily entwined with other strands of the school-age child's specific neighborhood life. Obviously, the more such entwining occurs, the stronger the clinic can make its net of supportive therapeutic assistance. In this respect, it is a very real asset to have the clinic sharing the same neighborhood with the child's home and the school he attends.

As a result, the clinic's clear understanding of the child's personality organization and special needs can be shared with the school, sometimes at the point the child enters the elementary grades. The clinic can continue contact as these nursery children enter the pre-adolescent period between 6 and 12.

The severely damaged child, with low self-regard and insufficient sense of being able to hold his own adequately with peers, can profit by a special facility set up purposively to help him find group contact as therapeutic for him as it can become. This need is supplied as part of a total treatment plan when such a child, with weak ego and low self-confidence, is placed by the settlement house clinic in a special small group (therapy or transitional) which has an adult leader from the clinic staff and group members who are familiar neighborhood peers.

It is significant that when a multifaceted treatment plan for the severely damaged school-age child occurs in a settlement house setting, the child's relationship with the clinic assumes a particular social meaning. The settlement house, as a structuralized social unit, becomes increasingly a part of the child's and the family's neighborhood life. The clinic therefore becomes to the child not only specific contacts at regular intervals with a therapist but also "the Hudson Guild" to which he feels that he

A Preliminary Report On RPR Test for Syphilis Using Unheated Serum

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THE RAPID plasma reagin (RPR) test was developed chiefly to permit rapid and economical screening of large numbers of persons so that reactors could be given immediate specific and prophylactic treatment (1). As reported recently (2), the objectives of the RPR test were realized when it was used at the reception center in El Centro, Calif., where large numbers of Mexican farm laborers were processed rapidly and economically by a small staff in an improvised laboratory at the site of operations. The success of the El Centro operation led to the establishment of four additional RPR testing stations on the border between Mexico and the United States.

Observations made during the development of the RPR test had suggested that the RPR antigen suspension could be applied to tests with unheated serum. It was found that the RPR antigen gave a satisfactory level of sensitivity and specificity in the SERA study (3) when 0.05 ml. of unheated serum was tested with 1/45 ml. of RPR antigen suspension.

As an extension of these studies, the testing of unheated serum using the RPR antigen and the same technique as for testing unheated plasma was undertaken. The results of testing two groups of specimens are reported here.

Materials and Methods

One group of 149 specimens was obtained during evaluation studies of anticoagulants for the RPR test on unheated plasma. These specimens were duplicate samples drawn to produce the conventional clotted-blood specimens.

Most (1,740) of the specimens studied were collected in North Carolina during a serologic survey conducted by personnel of the venereal

disease control section, North Carolina State Board of Health, under the direction of Dr. B. J. Rosenblum.

The technique used for testing with unheated serum was as follows:

Preparation of antigen suspension. The RPR antigen suspension was prepared by the method originally described for use with the RPR test on unheated plasma (1).

Preparation of specimens. The blood specimens were centrifuged at room temperature at 1,500-2,000 rpm for 4 minutes. The serum was allowed to remain in the original collection tube. Specimens were then tested without heating.

Performance of test. Procedure was the same as originally described for performance of the RPR test (1), except that three drops of serum instead of three drops of plasma were used with one drop of antigen suspension. Both serum and antigen suspension were at room temperature at the time of testing.

In addition to the RPR test on unheated plasma (performed as described (1) on the first group of specimens only), the other serologic tests used were the VDRL slide (4) and the tpcf 50 (5). These two tests were performed on serum separated from the clot after completion of the RPR test with unheated serum. For both tests the serum was heated at 56° C. for 30 minutes.

Results

Samples of all 149 of the first group of specimens were subjected, over a period of several months, to the four serologic tests. Comparative serologic findings for this group are shown in table 1.

The reactivity rates (the sum of reactive plus weakly reactive results expressed as percentages of the total results) of the four tests were quite similar for this group of specimens. The RPR test on unheated serum and the VDRL slide test were 45.0 percent reactive, the tpcf 50 test was 47.0 percent, and the RPR test on unheated plasma was 49.0 percent reactive.

Dr. Portnoy and Dr. Garson are with the Venereal Disease Experimental Laboratory, Communicable Disease Center, Public Health Service, at the University of North Carolina's School of Public Health, Chapel Hill. Dr. Portnoy is an immuno-serologist and Dr. Garson is laboratory director. Technical assistance was provided by Carl Adams.

munity provision of a specific treatment resource which will focus upon their special long-term treatment needs.

The school-age child has been treated individually and in therapeutic groups (adjustment, transitional, and activity). For the severely disturbed children, we have set up the multifaceted treatment plan as described. The

public school plays an important role in the functioning of this multifaceted treatment plan. At present, a number of these severely disturbed children still on our caseload have been suspended from school. They are not delinquent and are of prepuberty age. A special effort is very much needed to provide the necessary help for these children.

exhibit

A Second Look is Worth 1,000 X-rays

Dual reading of chest X-rays taken in tuberculosis caselisting programs is generally recognized as being productive but as yet has not been employed extensively in the United States. The Tuberculosis Branch of the Public Health Service is promoting the use of this technique in tuberculosis control by various means, including the exhibit shown here.

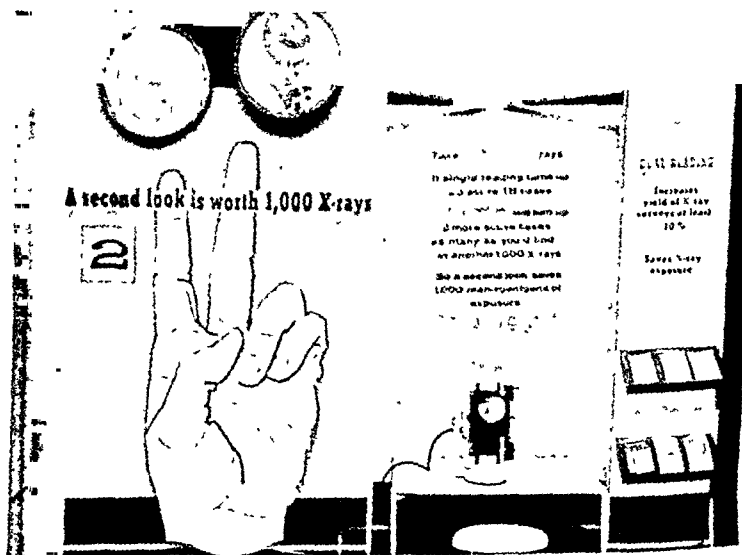
The exhibit points out the two main benefits of dual reading: increased yield of new cases from the same number of films and reduced radiation exposure. A roll of films with examples of suspected abnormalities missed on a single reading is shown in a viewer to allow physicians to check their own interpretations. Reports which indicate that dual reading increases the yield of new cases by at least 10 percent are summarized in an accompanying leaflet, which can be used for future reference.

Designed for use at national, re-

gional, and other meetings and conferences of people concerned with tuberculosis control and exposure to radiation, the exhibit is available free upon request. However, it must be manned by a Tuberculosis Branch staff member, and its availability will depend on whether a member can be assigned. Shipping

costs are paid by the borrower, but leaflets are provided for free distribution.

For further information write the Tuberculosis Branch, Division of Special Health Services, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington 25, D.C.



Specifications: A 3-panel exhibit on legs, fabricated of lacquered plywood and steel framing, 9 feet long, total weight 580 lbs., including 2 packing crates. Only one electrical outlet, 110 a.c., 500 watts, is needed for illumination. The film viewer, containing X-rays, is an integral part of the exhibit.

Table 3. Comparison of results of original RPR test with unheated serum and retest 1 week later of 68 specimens

Type of reaction	Original RPR test with unheated serum	Repeat RPR test with unheated serum stored approximately 1 week		
		Reactive	Weakly reactive	Nonreactive
Reactive.....	16	14	2	0
Weakly reactive.....	2	0	2	0
Nonreactive.....	50	0	1	49
Total.....	68	14	5	49

storage of serum separated from the clot, repeat tests with unheated serum were performed on 68 specimens about 1 week after the first test (table 3). Of 16 originally reactive specimens, 14 were reactive and 2 weakly reactive on the retest. No change occurred for the 2 weakly reactive specimens. Of the 50 originally nonreactive specimens, 1 was weakly reactive on the retest.

Discussion

The results of testing the group of 149 specimens (table 1) indicated a close correlation between the RPR test on unheated serum and the RPR test on unheated plasma, as well as between RPR (unheated serum) and the VDRL slide and tpcf 50 tests. Agreement between test results on the group of 417 specimens (table 2) was somewhat lower.

Most of the disagreement observed for the group of 417 specimens was confined to the 94 specimens which tested either weakly reactive or negative rough on the RPR test with unheated serum (table 2). Since these 94 represented almost 25 percent of the total group of 417 specimens, a greater effect on the degree of agreement for that group could be expected than for the group of 149 specimens, where the 11 weakly reactive specimens comprised only 7.3 percent of total specimens. The percentage of agreement would be higher for the RPR test and both the VDRL and tpcf 50 tests if the specimens giving negative rough reac-

tions in the RPR test with unheated serum and a reactive or weakly reactive result in the other serologic tests (table 2) were considered to be in agreement.

The two groups of specimens also may have undergone dissimilar losses of reactivity due to different lengths of time between the taking and testing of the samples. This is another possible explanation of the lesser agreement of the 417 samples (table 2). The 149 specimens were examined within 24 to 48 hours after withdrawal, but a longer period separated the withdrawal and the testing of the 417 specimens. Although there could thus have been a change in reactivity to the RPR test with unheated serum between the time when these 417 samples were drawn and the time they were first tested, no significant changes in reactivity after the first test were observed in the 68 samples retested about 1 week later (table 3).

Although the RPR test with unheated serum appears to be less reactive than the RPR test on unheated plasma, its reactivity compares favorably with that of the VDRL slide test. The demonstration that RPR antigen can be used in tests with unheated serum widens the field and program usefulness of this antigen, since specimens collected in anticoagulants or in tubes without anticoagulant can be examined rapidly and economically with the same equipment, reagents, and personnel. However, if the objective is to obtain the maximum screening efficiency of RPR antigen, the test with plasma should be employed.

Conclusion

RPR antigen suspension may be used to test unheated serum using the same procedure as for unheated plasma. This broadens the usefulness of RPR antigen in syphilis control screening programs, though its maximum screening efficiency is realized in its use with the plasma test.

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Table 1. Comparison of results of RPR test (unheated serum) with results of 3 other serologic tests on 149 specimens

Type of reaction	RPR test with unheated serum	RPR test with unheated plasma			VDRL slide test			tpcf 50 test	
		Re-active	Weakly reactive	Non-reactive	Re-active	Weakly reactive	Non-reactive	Re-active	Non-reactive
Reactive.....	56	55	1	0	50	4	2	53	3
Weakly reactive.....	11	9	2	0	6	2	3	11	0
Nonreactive.....	82	3	3	76	3	2	77	7	75
Total.....	149	67	6	76	59	8	82	71	78

Defining agreement as a reactive or weakly reactive result to one test accompanied by a reactive or weakly reactive result to the other test, results to the RPR test on unheated serum and to the RPR test on unheated plasma agreed in 96.0 percent of the cases. Results to RPR on unheated serum and to both VDRL slide and tpcf 50 tests agreed in 93.3 percent of the cases.

The group of 1,740 specimens obtained from the serologic survey were given the RPR test with unheated serum in the Venereal Disease Experimental Laboratory, with the following results:

	Number of specimens	Percent of specimens
Reactive.....	156	9.0
Weakly reactive.....	48	2.8
Nonreactive.....	1,536	88.3
Total.....	1,740	100.1

On the basis of results, 417 specimens were selected for comparative testing with the VDRL

slide and tpcf 50 tests. The specimens, when sufficient serum was available, included all those which had tested reactive, weakly reactive, or "negative rough," as well as an approximate 10 percent sample of the nonreactives (showing no clumping). Specimens in the "negative rough" category showed some clumping, but less than those categorized as weakly reactive and were reported nonreactive.

The VDRL slide and tpcf 50 tests were performed on these 417 specimens 6 to 7 days after the RPR test with unheated serum (table 2). The RPR test on unheated serum showed the lowest reactivity rate—45.6 percent. VDRL slide test results were 49.9 percent reactive, while the tpcf 50 test, with results 54.5 percent reactive, showed the highest reactivity rate. RPR test (unheated serum) results agreed with VDRL slide test results in 86.8 percent of the cases, with tpcf 50 test results in 82.7 percent of the cases.

To determine the effect on the RPR test of

Table 2. Comparison of results of RPR test (unheated serum) with results of 2 other serologic tests on 417 specimens

Type of reaction	RPR test with unheated serum	VDRL slide test			tpcf 50 test	
		Reactive	Weakly reactive	Nonreactive	Reactive	Nonreactive
Reactive.....	150	102	38	10	143	7
Weakly reactive.....	41	4	28	9	30	11
Negative rough.....	53	4	30	19	34	19
Nonreactive.....	173	0	2	171	20	153
Total.....	417	110	98	209	227	190

WORLD HEALTH FOR WORLD PEACE

Many of the Nation's leaders in medicine, public health, education, science, and industry and leaders in Congress and the executive branch of the Federal Government gathered at the Second National Conference on World Health held in Washington, D.C., May 7-9, 1959. The meeting was sponsored by the National Citizens Committee for the World Health Organization with the assistance and participation of more than 200 health, educational, welfare, civic, and business organizations. The committee was organized 6 years ago to inform Americans about international health problems, the work of WHO and other agencies in solving these problems, and why international cooperation is important both for health and for peace.

Dr. Milton S. Eisenhower, president of Johns Hopkins University, served as chairman of the conference, which was held immediately prior to the 12th World Health Assembly in Geneva. Dr. Ernest L. Stebbins, president of the National Citizens Committee for WHO, opened the conference, which was attended by approximately 1,500 persons.

In addition to providing stimulus and direction, the conference was significant in shaping and clarifying U.S. policy on international health matters, according to Dr. Leroy E. Burney, Surgeon General of the Public Health Service.

More than 50 speakers and discussion leaders ranged over subjects related to international health within the general context of the conference theme, "World Health for World Peace." Following this summary of their comments is the full text of the speech given by Dr. Abraham Horwitz, director of the Pan American Sanitary Bureau, the Regional Office for the Americas of the World Health Organization.

There was striking unanimity in support of a bigger, stronger World Health Organization,

an organization more adequately financed to meet the challenge of a world in which two-thirds of the population live in conditions of disease, malnutrition, poverty, and ignorance.

Speaker after speaker stressed the vital part that world health must play in reaching world peace and stability. And pervading the conference was the feeling that the atomic age had placed humanity at a crossroads, the road to annihilation or the road to peace through cooperation. Dr. Andrew W. Cordier, executive assistant to the United Nations Secretary General, expressed this feeling when he said that "the threat of the atom is a threat which is countered in turn with the promise of the atom, and therefore the delicate balance between that which is destructive and that which gives vast promise is a balance fraught with greater consequences than ever before in the history of the world."

International Understanding

An opinion voiced by several speakers was that, of all the fields of international endeavor, world health is best suited to provide experience in working together without competition in a cause in which all believe. In his opening statement Dr. Eisenhower said:

"Peoples of vastly different cultures can work together in harmony in this noncontroversial area. Here an achievement in one country is a benefit to all others. Here multilateral cooperation is not a subtraction in one nation to achieve addition in another. Rather it is a multiplication of benefits to all. Massive success in international health cooperation could well serve as a model for other efforts to build a cooperative world characterized by peace, freedom, and justice."

Reinforcing this view, Arthur S. Flemming, Secretary of Health, Education, and Welfare stated that "an effective health for peace cru-

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New Members of the PHR Board of Editors

Three new members have joined the Board of Editors of *Public Health Reports* for a period of 3 years. Outgoing members are Mary Switzer, Dr. Franklin H. Top, Dr. Mandel E. Cohen, and Dr. Carl C. Dauer.

Roger W. Howell, M.D., is currently an associate professor of public health practice in the School of Public Health at the University of Michigan. He has held positions on the faculties of the medical schools of the University of Michigan and the University of Minnesota, as well as in the School of Public Health of the University of North Carolina.



Dr. Howell has worked in public health programs since 1951. He has served on several committees in the American Psychiatric Association and is a member of the Committee on Preventive Psychiatry of the Group for Advancement of Psychiatry. He also serves as a consultant for the Public Health Service in the field of mental health.

Most of Dr. Howell's psychiatric training was obtained at the University of Michigan, where he also received his basic medical training.

Albert L. Chapman, M.D., has been Assistant Surgeon General and chief, Division of Special Health Services, Public Health Service, since 1956. He was regional medical director of Region II during 1954-56, and of Region III in the period 1951-54, after serving 2 years as assistant chief of the Chronic Disease Branch.



After he was graduated from the Long Island College of Medicine in 1937, he received the master of public health degree from Johns Hopkins University

in 1941. Dr. Chapman held the post of regional medical director of the New Jersey State Health Department at Trenton for 2 years. During the following 3 years, he held successive posts with public health agencies at town, county, and State levels and with the Public Health Service in Region II.

Dr. Chapman is a fellow of the American Public Health Association and the Royal Sanitary Institute of England. In addition to membership in numerous professional organizations, he is prominent in activities of the National Safety Council and the American Public Health Association.

Helen M. Wallace, M.D., M.P.H., has been professor of maternal and child health at the University of Minnesota School of Public Health since 1956. Previously she was professor and head of the department of preventive medicine and public health in New York Medical College, 1955-56. During the preceding 13 years, she served in the New York City Health Department as chief of the maternity and newborn division and director of the bureau for handicapped children. Dr. Wallace received the degree of master of public health, cum laude, from the Harvard School of Public Health after earning a doctorate in medicine at the Columbia University College of Physicians and Surgeons.



Besides serving as the current national health chairman of the National Congress of Parents and Teachers, Dr. Wallace is secretary of the maternal and child health section and a member of the committee on child health of the American Public Health Association. She is, in addition, assistant editor of the *Journal of the American Women's Medical Association*, as well as a diplomate of both the American Board of Pediatrics and the American Board of Preventive Medicine.

ous areas in the Philippines, areas now freed from that disease. In one small region in Greece, he said, following a malaria eradication program, the rice yield increased four times. In many countries deficient in food production, like India, potentially rich agricultural lands have lain fallow for centuries, depopulated by the ravages of malaria and other preventable diseases. Such lands are now being brought back into cultivation with the restoration of health, Dr. Rusk said.

Another point developed at the conference was that, once people generally recognize their enormous economic stake in the improvement of world health, they will be more generous in their contributions to the funds necessary to get on with the job.

Dr. Flemming urged voluntary organizations to develop and support private programs to provide medical care and teaching in other nations. "I am convinced that these voluntary groups, through their international organization and counterparts in other countries, can bring peoples of other countries to the point where they will have an appreciation of the values that flow from private groups within their communities taking the initiative in dealing with their own health programs," he said.

Congressman Judd also stressed that voluntary organizations and individuals can make important contributions because they are not bound by government protocol and have more opportunity for imagination, experimentation, and demonstration.

"Strong support of the United Nations and its various specialized agencies such as the World Health Organization represents a fundamental part of United States foreign policy," Mr. Wilcox assured the conference in reviewing the benefits, both indirect and direct, that the United States had derived from WHO's work in raising health standards everywhere. He listed these benefits as the control or eradication of infectious disease at the source, rapid reporting of disease outbreaks almost worldwide, exchange of information and ideas on health and medical advances, the international laboratory networks, and recommendations of common names and standards of purity and potency for drugs and biologicals and the preparation of biological standards.

Secretary Flemming urged that the major contributing nations of the world, including the United States, increase their financial support of WHO. This position was strongly endorsed by Senator Hubert Humphrey, who urged increased contributions, stating that the present total of \$26 million available annually to the Organization (including all sources of funds, not only the regular budget) was not enough even to scratch the surface of WHO's responsibilities. Several speakers contrasted the vast sums spent annually on research and production of weapons for mass destruction with the relatively insignificant amounts devoted to promoting better health throughout the world.

During the conference many suggestions were made concerning the manpower necessary to carry out an effective "health for peace" crusade. Participants in a forum discussion devoted to international medical research emphasized the importance of developing a career pattern which would permit young scientists and teachers to accept assignments in other countries. They suggested collaborative arrangements between universities in the United States and other countries to permit rotating persons as a requisite of career advancement.

Both WHO and the International Cooperation Administration are using regional training centers more extensively, according to Dr. Howard M. Kline, Division of International Health, Public Health Service. He felt that it was best to train candidates in their own countries or in areas where educational traditions, culture, and language are familiar, and that training in the United States was a last choice because our educational centers are adapted to interests and traditions foreign to students from most other countries.

Congressman Judd urged more care in selecting personnel, earlier and more intensive study of languages, and 3-year tours overseas.

Expanding WHO Activities

Looking to the future, a number of suggestions were made for the expansion of international health activities. Secretary Flemming asked for a mobilization of the resources of national and international, official and voluntary agencies in a coordinated plan to accom-

sade could do more to bring peace in our time than any other single program." Senator Lister Hill quoted Dr. Gunnar Gundersen, president of the American Medical Association, to the effect that "medicine with its influence and its resources fully mobilized, can perhaps do more for world peace than all the billions of dollars poured into armaments."

Leo Cherne, chairman of the board of the International Rescue Committee, pointed out, "Medical aid cannot be misrepresented as flowing from self-interest; it cannot be regarded as action remote from the needs of people; it cannot be linked with regimes which may or may not be popular." He added, "When we apply our resources and our talents to the medical needs, the life and death needs of diseased and deprived peoples, we take the final step and one which cannot be misinterpreted."

Cooperation in medical research and in disease control is setting habits and attitudes that "are transferable and will subtly but surely have a beneficial influence on the political climate in the world," stated Assistant Secretary of State Francis O. Wilcox, adding that future historians will credit the present campaigns for the total elimination of disease as among the most remarkable and important achievements of mankind.

Several speakers warned their fellow Americans against attitudes of smugness and self-sufficiency in their relations with some of the lesser developed areas of the world. We have as much to learn from people of other countries as they have to learn from us, stated Dr. Cordier. United Nations technical workers, he said, have found so much individual skill, understanding, and wisdom in the so-called underdeveloped countries that they have come back from their overseas assignments with feelings of great humility and a more realistic perspective of the world.

Brains are not the monopoly of any country, said Congressman Walter H. Judd, who himself spent many years in China as a medical missionary. He pointed out that most of the basic medical discoveries "came from some place where you didn't expect them to come from." This brought up reference to a comprehensive listing of hundreds of medical discoveries in general use today and the geographic

source of their origin, published recently in a U.S. Senate Committee report.

Economic Stake in Health

America's stake in world health was a major subject of discussion at the conference. According to Congressman Judd, those countries with the highest health standards have most to gain from improved world health, and most to lose from diseases that can sweep in from abroad. He reminded his listeners that WHO had, in the past 10 years, checked half a dozen tremendous epidemics "that could have swept over the world including the United States."

Americans must be made to realize the health in the rest of the world is in their own self interest, Senator Richard L. Neuberger stated in support of that thesis. And the American stake in world health is not limited only to the protection of health in the United States, it was pointed out.

One of six forum discussions held during the conference was devoted to health and economic development. Improved health standards are indispensable for any real economic development, it was maintained, since the human resource is the richest economic asset in any country. Poverty-stricken, disease-ridden populations are not a good market for industrial products, and their own output is low and poor in quality.

Mr. Cherne urged that "we recognize that military and economic progress cannot be separated from the physical strength and vitality of any people. Effective economic aid requires a reasonably healthy work force. Viable operation of new industries, no matter how modest, requires a community reasonably free from infection, reasonably capable of applying energy, a community free from unnecessary blindness, debilitating diseases, malnutrition, and a whole variety of ills which affect the stomach, the hands, the limbs, the muscles of men, women, and children of so much of the world."

A related aspect of America's stake in world health was brought out by Dr. Howard A. Rusk, associate editor of the *New York Times*. He maintained that Americans had been paying a 15 percent hidden tax on every article exported to this country from certain malarial-

In so doing, public health lays the foundations of human dignity and self-respect and promotes peace of mind, the basis for harmonious existence within families, groups, and communities.

So conceived, health has a universal projection as part of the efforts of mankind to achieve welfare, peace, and happiness. Galen said 2,000 years ago, "Health is a sort of harmony."

Constant Interrelationships

Good health, however, does not solve all the problems of welfare. For the progressive evolution of organized communities, human energy of high quality is essential, and this in turn implies an equally high quality of public health. But equally essential is education appropriate to the different periods of life, with a minimum indispensable for all, in order to facilitate adaptation to the environment and thus bring about good human relations. Of no less importance are adequate nutrition, housing, and income; in sum, rational and balanced economic development. It is from such development that will come the production of enough to satisfy the needs of an increasing population.

There is a constant interrelationship among health, economy, and social progress. Experience shows that immediate results can be obtained through organized public health, but the effect will not be lasting unless the other factors which condition well-being are improved simultaneously. It is not enough to maintain a healthy population able to produce and consume, even though it has a sense of responsibility and awareness of common effort to achieve common good. Such a population, constituting a veritable reserve of human energy, demands opportunities for self-realization which can be supplied only by means of well-rounded economic development.

The vicious circle of poverty and disease cannot be successfully broken by attacking disease only. The important thing is to take positive action on all the major factors relating to poverty.

These principles are, in our opinion, the basis for a cooperative effort throughout the Americas to bring about economic development and the welfare of the people in orderly and progressive fashion. To achieve this aim, govern-

ments and the international organizations they have created, supported by individuals and groups in all walks of life, must join together. The urgency of this task is revealed by the present condition of the peoples of the Americas.

Latin America is today the world region which shows the most rapid increase in population. The present rate is almost double the average of other regions, so that the figure of 182 million estimated for 1958 may approximate 592 million by the year 2000. Seventeen of the twenty Latin American countries are expected to double their populations in less than 35 years. Furthermore, this is a young region with 40 percent of its population under 15 years of age. Life expectancy at birth is generally less than 50 years and only in a very few urban communities reaches 60. If to this predominantly youthful population the weight of disease is added, there cannot be enough productive capacity to meet the needs of all.

In these countries infant mortality and child mortality are tragically high, largely because of poor sanitation, prevalence of acute communicable diseases, inadequate nutrition, ignorance, and poverty. The predominance of communicable diseases as the major problem offers great possibilities for organized public health in the Americas, particularly if integrated in a program of economic development.

Water is as important to health as it is to industrial development, yet a water supply in the home is all too uncommon in Latin America. Even in urban areas, at least 30 million people live in dwellings without water; adequate sewage disposal is found even less often. Furthermore, tourism is an important industry in Latin America, and tourism cannot really thrive where water supply and sewage disposal are inadequate and unsafe.

There is still a high proportion of illiteracy, in many of these countries reaching over 50 percent of the population. No community can progress where illiteracy reigns since the people do not have access to sources of knowledge and information.

Latin America has shown in recent years an impressive increase in total production of food, yet, with a rapidly growing population, per capita output has decreased by 6 percent. At the same time, in the great majority of the coun-

plish three health objectives: mass control of preventable diseases, provision of modern health and medical services to the total world population, and advancement of medical science through pooling of knowledge and skills and through development of worldwide research potential.

To accomplish these objectives, Dr. Flemming advocated far greater reliance on WHO than at present. It should be up to the World Health Organization, he said, to set the goals and priorities and to map programs for common action to be carried out cooperatively by international, regional, national, official, and voluntary organizations. He stated further that United States bilateral health programs should be directly related to the attainment of agreed-upon world goals as they are worked out through WHO. "As we as a Nation step up our support of international health, we should shift to a multilateral program as rapidly as this can be done, consistent with our overall foreign policy objectives," Secretary Flemming said.

Senator Humphrey proposed that WHO move more fully into the field of the health aspects of atomic radiation. This is one area, he said, in which WHO will have an unparalleled opportunity for leadership, a leadership in a field which overlaps and overflows the scientific into the political—the area of radioactive fallout. "WHO is uniquely qualified to play a far larger role than at present in securing scientific meeting of the minds as to effects of radioactive fallout on present and future generations," he stated.

Urging a greatly expanded WHO program, Senator Humphrey stated that the existence today of malaria, smallpox, hookworm, yaws, trachoma, and tuberculosis "represents a blot on the conscience of modern man. They are a formidable barrier on the road to any world of progress, peace, and plenty." To cope with this on a really effective scale, he urged the bold mobilization of American resources. WHO should be encouraged and helped, he said, to launch campaigns for the eradication, not only of smallpox, but a whole selection of those diseases amenable to eradication. And WHO should be supplied with the funds necessary to accelerate man's search for answers to

the "battering" diseases such as cancer, heart disease, and arthritis, he said.

The Senator then made a dramatic proposal for the use of food surpluses aimed at breaking the vicious circle of, as he put it, hunger breeds disease—breeds poverty—breeds hunger. Storage costs of surplus foods in warehouses, he said, have amounted to a billion dollars a year, to which should be added another quarter of a billion dollars for the annual cost of deterioration.

Dr. Thomas Parran, former Surgeon General of the Public Health Service and a past president of the National Citizens Committee for WHO, struck a note of optimism for the future outlook when he suggested that although progress toward world health has been substantial, "we may be on the eve of the greatest forward movement in this relatively new type of collaboration and cooperation among peoples that the world has ever seen."—HAROLD BALLOU, *consultant, Office of the Surgeon General, Public Health Service.*

The Humanistic Relevance Of Public Health

From its beginnings, medicine has evolved as an art based on moral and aesthetic principles, pursuing the knowledge of man as a whole being, both in his physical and spiritual aspects, to assist him in health and disease. As the scientific phase of medicine developed, knowledge of human nature was deepened and the scope of medicine was enlarged. The good physician serves mankind with generosity, sensitivity, and kindness.

Medicine is thus, in essence, humanism—understanding man in historical perspective and social evolution, surrounded as he is by an ever-changing environment. With these objectives, medicine today is both a biological and a social science bearing directly on all the complexities of society, including man's beliefs, traditions, ideas, and ways of living.

For man as a member of society living in a community, community medicine becomes public health. And public health is the expression of man's endeavors to prevent disease, to protect and promote health, and to lengthen life.

Standardization of the crude birth and death rates of the U.S.S.R. indicates that, contrary to the claims, Soviet mortality is higher than that of the United States and its fertility is lower.

Analysis of Mortality and Fertility Data of the Soviet Union

ROBERT J. MYERS

BOTH MORTALITY and fertility are sometimes measured by so-called crude rates. The crude death rate is merely the number of deaths in a year divided by the average total population during the year (or the total population in the middle of the year). Similarly, the crude birth rate is based on the total number of births in the year and the total population. Analysis of these crude rates possesses a certain significance if confined to a single country over a period of a few years, but even here there are certain limitations and dangers. Even greater difficulties, and in some instances insurmountable ones, arise if international comparisons are made. The main reason is the difference in age structures of the basic populations, either in the same country at different times or in different countries.

The following extreme example of the effect of age structure on the crude death rate is indicative of the weakness of this measure for analytic purposes. Consider town A, consisting primarily of a large university, with accompanying service facilities. It would naturally be expected that this town would have a very low crude death rate because most of its residents are young students. On the other hand, consider town B, which because of its favorable warm climate is a haven for retired persons. This town would obviously show a relatively high crude death rate, one much higher than town A, despite the fact that it

might be the "healthier" place in which to live if the population structures were the same.

This paper examines and analyzes the available data on mortality and fertility in the U.S.S.R. In recent years, the data that have been released have been extremely limited. They include only such items as crude birth and death rates, total population, and expectation of life at birth. There are no figures by age for the population or for deaths, births, or expectation of life.

The Soviet Union frequently lays great emphasis on its crude birth and death rates. For instance, its first report on the 1959 census stated that the death rate is the lowest in the world (1). This statement has also been made a number of other times about previously published crude rate figures, despite the fact that the U.S.S.R. has released figures for the expectation of life at birth for recent years that are some 6 percent lower than those of the United States. Similarly, on the basis of crude birth rates, the U.S.S.R. claims a high fertility rate.

World Comparisons of Death Rates

Before analyzing the effect of standardizing the U.S.S.R.'s mortality rates, let us see whether

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tries, the consumption of protein of animal origin is far below the physiological minimum.

The housing problem in Latin America is proverbial. In large areas houses are completely inadequate, and the amount of construction does not keep pace with the normal increase of the population.

As a corollary of all this several countries are undergoing serious inflation, with increasing cost of living, which further reduces an income already insufficient for basic needs.

Economic Roots

At the root of the entire process of development are the economic conditions. Cultivation of arable land in Latin American countries is limited to 4 percent of the total surface. There is an acute insufficiency of capital. Industrial development is in its beginnings and exports are limited. Production is not sufficiently diversified, and all too often countries depend on a single product. Geography is difficult, with large rural areas and inadequate means of communication and transportation, which often make access to resources impossible. If one adds the constant increase of population, it is easy to understand the high rate of unemployment.

Although there is sufficient knowledge to cope with most of the major public health problems of the Americas, the number of trained professional and auxiliary personnel is inadequate. Besides the insufficiency of material resources, local and national health services do not have adequate organization to obtain the best possible yield from the available personnel and resources.

In spite of these shortcomings, progress has been and will continue to be substantial, and the efforts of the governments, with the assistance provided by international organizations, have major accomplishments to their credit.

The World Health Organization and the Pan American Health Organization are actively collaborating with the member governments in strengthening national and local health services, in training professional and auxiliary personnel, in controlling or eradicating acute and chronic communicable diseases, and in searching for new methods for the protection and promotion of health.

The greater the progress toward elimination of pestilence, the clearer becomes the relationship between health and economic progress.

The basic activities in public health, those which further optimal human growth and development by diminishing risks stemming from the physical and social environment, require good planning and organization, well-trained personnel, and large amounts of capital. In the present stage of Latin American growth this capital can be obtained by cooperative measures among all the governments, through a carefully planned and progressive program. The creation of the Inter-American Bank for Development and the current discussions about a common market are excellent indicators of the desires motivating the governments of the Americas. When combined with other similar steps, these measures will clearly serve to improve the living conditions of the people of our hemisphere, while respecting their ideals and individual cultures.

Because this development is so consistent with the philosophy expressed in the constitutions of the World Health Organization and the Pan American Health Organization, it seems to me inevitable that public health activities will be a major aspect of the balanced plan for economic progress which I foresee.

Our countries are passing through a phase of destiny which calls for genuine merging of forces to face the major problems of today and tomorrow. But we must always keep before us that our ultimate aim is the welfare of mankind.

The moment in which we live is a real challenge to fate which needs to be expressed in simple and direct terms and requires equally simple and direct answers.

We health workers believe that we have shown what international collaboration can do to give incentive to progress. We offer this experience in order to help find the answers so badly needed in the world today. We do so with the conviction that in fighting for health we are fighting for peace.—ABRAHAM HORWITZ, M.D., *director of the Pan American Sanitary Bureau, Regional Office for the Americas of the World Health Organization.*

of a given standard to the age-sex distribution of the particular population under study. The deaths "expected" on the basis of the mortality standard can then be obtained. The standardized crude death rate can be computed for these "expected" deaths and then compared with the actual crude rate. The comparison indicates the relative level of the actual mortality of the population as against that of the mortality standard.

For analysis of the mortality experience of the U.S.S.R. in 1956, the actual experience of the United States in the same year is used as the mortality standard (7a). (Rates for the age group 0-4 years were modified because of the theoretical consideration that the number of births each year in the past 5 years in the United States would not necessarily have the same pattern as in the U.S.S.R. The difference, however, has relatively minor effect on the results as a whole.)

Table 1 sets forth the basic data used in the analysis and also the estimate of deaths that would have occurred in the U.S.S.R. population if U.S. mortality had applied. The resulting crude death rate is 6.18 per 1,000 (1,231,300

deaths divided by 199,336,000 population), or 20 percent below the reported U.S.S.R. rate of 7.7 per 1,000. This is a very low crude death rate and is due to the Soviet Union having a very young age distribution. The age-specific U.S. death rates when applied to the U.S. age distribution in 1956, of course, yield the previously mentioned crude death rate of 9.6 per 1,000, 25 percent above the reported Soviet crude rate, but 55 percent above what the Soviet crude rate would have been if that country's age-specific rates had been equal to those of the United States. The relatively young age distribution in the U.S.S.R. may be seen from the fact that only 7.8 percent of its population is aged 60 years and over as against 12.6 percent in the United States in 1956 (and about 20 percent for a stationary life table population based on current U.S. mortality and a constant annual number of births). The relatively low crude death rate currently reported by the U.S.S.R. is thus clearly due in considerable part to its relatively young age distribution.

Calculations standardizing mortality similar to those in table 1 have also been made for the U.S.S.R. for the officially reported age-sex dis-

Table 1. Application of U.S. mortality rates to U.S.S.R. population, Jan. 1, 1956

[Population and deaths in thousands; rates per thousand]

Age group (years)	U.S.S.R. population ¹		U.S. 1956 mortality rates ²		Estimated U.S.S.R. deaths	
	Male	Female	Male	Female	Male	Female
0-4.....	11,901	11,380	7.0	5.4	83.3	61.5
5-9.....	9,253	8,906	.5	.4	4.6	3.6
10-14.....	7,975	7,685	.6	.3	4.8	2.3
15-19.....	11,085	10,653	1.3	.6	14.4	6.4
20-24.....	8,299	8,057	2.0	.7	16.6	5.6
25-29.....	10,244	10,096	1.8	.9	18.4	9.1
30-34.....	7,198	8,573	2.1	1.2	15.1	10.3
35-39.....	4,141	6,359	2.9	1.9	12.0	12.1
40-44.....	4,643	7,452	4.6	2.8	21.4	20.9
45-49.....	4,987	6,918	7.6	4.3	37.9	29.7
50-54.....	4,628	5,870	12.0	6.4	55.5	37.6
55-59.....	3,378	4,449	18.6	9.8	62.8	43.6
60-64.....	2,311	3,097	28.4	15.1	65.7	46.8
65-69.....	1,710	2,540	42.6	25.3	72.8	61.3
70-74.....	1,119	1,690	59.6	38.2	66.7	64.6
75-79.....	635	1,046	86.2	62.0	54.7	64.9
80-84.....	285	536	134.4	109.7	38.3	58.8
85 and over.....	92	112	193.9	186.2	17.8	26.4
Total.....	93,887	105,419	-----	-----	662.8	568.5

¹ Reference 5. Subdivision of data for ages 70 years and over from unpublished data of the U.S. Bureau of the Census.

² Reference 7a, except that rates for age group 0-4 years are based on values obtained from abridged life tables (with weighting by relative proportions of white and nonwhite populations in this age group).

the reported crude death rate of the Soviet Union is the lowest in the world. The figure was 7.7 per 1,000 for 1956, which was definitely below the corresponding figure for the other major industrially developed countries in the world, such as Australia, Canada, New Zealand, the United States, and the Western European nations, most of which had crude death rates of from 8 to 12 per 1,000 (2*a*). On the other hand, there were a number of countries that had lower crude death rates than the Soviet Union: Greece (7.4), Iceland (7.2), Iran (6.8), Israel (6.6), Lebanon (5.5), Peru (6.8), Syria (5.4), and Uruguay (7.0). Many of these countries are not particularly noted for their favorable health or economic conditions. Probably the reason for the low crude death rates of these countries lies in the dual circumstances of a relatively young age distribution and the very significant postwar reductions in certain communicable diseases. Also, in some of these countries the accuracy of reporting of deaths and enumeration (or estimate) of the population may be questioned.

In 1956 certain outlying U.S. possessions and territories had lower crude death rates than the U.S.S.R.: Alaska (5.8), Guam (6.6), Hawaii (5.8), Puerto Rico (7.0), and Samoa (7.4). A number of small possessions of European nations, such as Angola, Cyprus, Fiji Islands, and Sarawak, also had very low crude death rates.

Trends in Crude Death Rates

The only official Soviet data on mortality for the last 30 years are crude death rates and infant mortality rates. Eliminating periods of war and civil strife, the decline in the crude death rate has been striking, from 30.2 per 1,000 in 1913 to 20.3 per 1,000 in 1926, to 18.3 per 1,000 in 1940, and then to 9.6 per 1,000 in 1950, followed by a steady decline each year thereafter to 7.7 per 1,000 in 1956 (3*a*). These figures are indicative, to a certain extent at least, of a real improvement, but how much the decline in mortality is due to improved health and how much to changes in age structure is a question.

Similar declines in the crude death rate occurred in other countries that had relatively

high levels of mortality before World War II. In Japan, for example, the crude death rate was 19.4 per 1,000 in 1913 and 19.2 per 1,000 in 1926, and declined to 16.2 per 1,000 in 1940, to 10.9 per 1,000 in 1950, and then to 8.0 per 1,000 in 1956 (2*a*, 4). Thus, the trend of the crude death rate in the period immediately preceding World War II and thereafter has been very similar in Japan and in the U.S.S.R.

The United States had a much lower level of mortality before World War II than the U.S.S.R. or Japan. Accordingly, although there was a significant improvement in mortality in the past half century in the United States, the crude death rate had a much smaller decrease than in many other countries. Thus, the U.S. crude death rate was about 14 per 1,000 in 1915. Over the next 40 years, in general, it declined gradually to a level of 9.6 per 1,000 in 1956. The actual improvement in health conditions was even greater than this because the age structure of the population shifted to a much older age distribution.

Standardization of U.S.S.R. Mortality Data

No recent information on deaths in the Soviet Union by age and sex is available. Without such data the only possible method of analyzing mortality experience is by standardization. The results achieved are not too informative, since it is desirable to analyze the experience by age and by sex in order to determine the true significance of any changes. But, in the absence of complete data, the standardization procedure is certainly better than no analysis at all.

The method of standardization requires that the age distribution of the population be available even though that for deaths is not. The Soviet Union has not released figures about the age distribution of the population since the 1939 census. However, detailed estimates for 1956 have been prepared by the U.S. Bureau of the Census (5) and also by an eminent French demographer (6). Although the two sets of figures differ somewhat, the resulting standardized death rates (and birth rates) differ by less than 3 percent.

The method of standardization is to apply the age-specific mortality rates, separately by sex,

thereafter in such manner as to give age-specific mortality rates that reproduce exactly the Soviet crude rate of 7.7 per 1,000 when they are applied to the 1956 age-sex distribution.

The age-specific mortality rates shown by U.S. experience were uniformly increased by 24.6 percent for the first assumption; for the second assumption, by 78 percent for age 0, 77 percent for age 1 year, decreasing by 1 percent for each year until there is no differential for ages 78 years and over. This latter treatment produced a crude death rate of 7.72 per 1,000 for the 1956 age-sex distribution and was adopted because of its simplicity (rather than beginning at 80 percent at age 0 and then working down to a zero differential in a more complex fashion). The U.S. age-specific mortality rates were developed from the complete life tables for 1956 prepared by the Metropolitan Life Insurance Co. from the official abridged life tables for 1956 (9b), which are for all persons and for each sex by race. The author developed therefrom corresponding tables for all males and all females, using also the official abridged tables for these two categories (unpublished data from the National Office of Vital Statistics).

The expectations of life at birth were then computed from the life tables developed from such age-specific rates. The results of these computations of expectation of life at birth for 1956 are shown in the following table, in comparison with the reported Soviet data for 1955-56:

Category	Reported figures	Computed figures	
		Constant differential	Decreasing differential
All persons---	67	66.5	65.7
Males -----	63	63.3	62.3
Females -----	69	70.0	69.5

The male and female figures obtained by assuming a constant mortality differential with age between U.S.S.R. and U.S. experience are actually somewhat above the reported values. However, the male and female figures based on a decreasing differential (starting higher and ending lower), which are probably the more logical, are reasonably close to the reported values. The reported figure for both sexes

combined is higher than the two computed values, but this has no significance because of the excess female population in comparison with what would be expected in a life table population.

Trends in Crude Birth Rates

Soviet data on fertility are as sparse as they are for mortality. The only official figures available are crude birth rates, the trend of which has been just as strikingly downward as that of the reported death rates. Thus, the reported crude birth rate was around 45 per 1,000 in both 1913 and 1926 and fell to 32 per 1,000 in 1940. In the 1950's, this rate has been relatively level at 25 to 27 per 1,000, with the 1956 figure being 25.0 (3a).

The trend and level of the crude birth rate in most of the industrialized and well-developed countries in the past half century (2b) have been somewhat different from the pattern in the U.S.S.R. In general, there was a steady decline until about 1940. In the 1950's, in most countries, the level has been definitely higher than that in the 1930's. However, in some countries (for example, Austria, Denmark, the Netherlands, and the United Kingdom) the level is about the same as in the 1930's and in a few, primarily in the Mediterranean area, the current level is lower than in the 1930's, just as in the U.S.S.R.

In the United States, the crude birth rate dropped from about 30 per 1,000 in the 1910's to a low of about 19 in the 1930's. Since World War II it has been about 25 per 1,000. In most of the Western European countries, the crude birth rate has been somewhat lower than in the United States, but with the same general trend; currently, the rates in these countries are about 16 to 22 per 1,000. Canada, too, has had about the same trend in the crude birth rate as the United States, but the level has generally been about 10 percent higher. In Japan, which has had somewhat the same trend in the crude death rate as the Soviet Union, the crude birth rate has displayed an entirely different trend from that of the U.S.S.R. (or for that matter, different from that in any other major country). The rate was level at about

tribution of the population in 1926 and for the estimated age-sex distribution in 1939. The estimate for 1939, prepared by Michael K. Roof, Legislative Reference Service, Library of Congress, is based on the officially reported census distribution by broad age groups (under 7, 8-11, 12-14, 15-19, decennial age groups up to 60, and 60 and over), supplemented by sex breakdowns from literacy data and by projections to 1939 of the 1926 census data and of data on subsequent births.

The mortality standards used for the 1926 and 1939 population distributions are the actual age-specific death rates, by sex, for the United States for the same years. For 1926, the U.S. age-specific death rates are available only for certain age groups (under 1, 1-4, decennial age groups up to 85, and 85 and over); therefore, the Soviet census data were grouped accordingly. For 1939, the U.S. age-specific death rates are available for the following age groups (unpublished data from the National Office of Vital Statistics): under 1, 1-4, quinquennial age groups up to 85, and 85 and over. The estimated Soviet age distribution for 1939 is available in similar groups except that ages 70 and over are combined, but breakdown into quinquennial groups has been made by assuming that the proportionate distribution of the population aged 70 and over in 1939 was the same as in 1926.

The resulting standardized crude death rates are compared with the reported crude death rates of the U.S.S.R. for closely corresponding periods in the following table:

Year	Crude death rate	Standardized death rate	Excess of crude over standardized rate (percent)
1926---	20.3	11.87	71
1940----	18.3	8.71	110
1956-----	7.7	6.18	25

The excess of the reported U.S.S.R. crude death rate over the standardized crude death rate based on U.S. experience has decreased very significantly in the past three decades, although immediately before World War II it was more than 100 percent and it still amounts to 25 percent. This change would seem to indicate that

there has been a very significant improvement in mortality in the Soviet Union in recent years, according to the reported crude death rates.

U.S.S.R. Data on Life Expectancy

Although no Soviet data on mortality experience by age have been released in the past three decades, figures have been published as to the expectation of life at birth (3*b*, 8). These, along with corresponding figures for the United States (9*a*), are as follows:

Period	All persons		Males		Females	
	U.S.S.R.	U.S.	U.S.S.R.	U.S.	U.S.S.R.	U.S.
1926-27----	44	58.6	42	57.2	47	60.0
1954-55----	64	69.6	61	66.7	67	72.9
1955-56----	67	69.6	63	66.7	69	73.0

The reported improvement in the expectation of life at birth in the U.S.S.R. in the last three decades is very significant. Although the U.S.S.R. rate of improvement has been greater than that of the United States, the latter still shows a significantly higher expectation, by 3.7 years for males and 4.0 years for females. Interestingly, the difference is only 2.6 years for both sexes combined, which is the result, in large part, of the higher proportion of women in the U.S.S.R. than in the United States (the 1956 sex ratios of the total population were 887 and 984 men per 1,000 women, respectively). This comparison demonstrates why it is desirable to consider mortality experiences separately by sex.

The data on expectation of life at birth in the U.S.S.R. for 1955-56 can be analyzed, to a certain extent, on the basis of the standardization analysis previously made. This indicated that, in the aggregate, Soviet mortality in 1956, when standardized by age and sex, was 24.6 percent higher than U.S. mortality for the same period. It may first be assumed that this difference applies at each age, although this is almost certainly not the case. Since the infant mortality rate in the Soviet Union was reported as 47 per 1,000 in 1956 (10), or about 80 percent higher than that of the United States for the same year, another possible approach is to assume a graded differential that is about 80 percent at age 0 and that decreases

order, showing the ratio of children of a particular birth order to total children:

Birth order	U.S.S.R. (percent)	U.S. (percent)	Ratio U.S. to U.S.S.R. (percent)
1 -----	8.6	11.1	129
2 -----	4.6	5.8	126
3 -----	2.5	3.2	128
4 and higher -----	2.2	5.0	227
Total -----	17.9	25.1	140

The higher birth orders in the United States are clearly more prevalent than in the Soviet Union. This finding confirms the results of the other analyses; that is, that fertility is significantly higher in the United States than in the U.S.S.R.

Summary and Conclusions

The Soviet Union frequently makes the claim that its mortality is the lowest in the world, whereas in the past it was extremely high. These statements are made on the basis of the crude death rate, which is currently reported at a relatively low level, for 1956 some 20 percent lower than the United States. However, the Soviet Union has also reported figures for the expectation of life at birth, which, for 1956, are about 4 years lower than for the United States, for both men and women.

Similarly, the only figures available as to fertility are the crude birth rates. On the basis of these, the U.S.S.R. claims a high fertility rate. Actually, in recent years, the Soviet crude birth rate has been well above that of most Western European countries, but virtually the same as for the United States.

This paper has analyzed mortality and fertility in the U.S.S.R. on the basis of standardization by age. This procedure is especially necessary in dealing with data for the Soviet Union because of the unusually young age distribution of the population. The resulting analysis indicates that Soviet mortality as reported, after taking into account age and sex distributions, is about 25 percent higher in the aggregate than that of the United States, while fertility is about 24 percent lower.

Analysis tends to confirm to a considerable extent the reliability of the reported Soviet figures on expectation of life at birth, assuming the accuracy of the reported crude death rates. The differential in life expectancy between the United States and the U.S.S.R., for each sex, currently amounts to about 4 years (in favor of the United States).

Considerable improvement in mortality in the U.S.S.R. has undoubtedly occurred since the pre-World War II period. This same trend, however, has been present in many other countries throughout the world that had relatively high mortality in the past.

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- (10) Vestnik statistiki, Moscow, No. 10, 1958, p. 93.

33 per 1,000 from the turn of the century to the beginning of World War II and for a few years thereafter (4), but then it declined sharply to about 18 per 1,000 in 1956.

The current level of the Soviet crude birth rate is thus relatively high as compared with that of other major industrialized countries, although not high in comparison with many of the underdeveloped countries, which have rates as high as 40 to 50 per 1,000. But this high crude rate is not necessarily an indication of high fertility in the U.S.S.R.

Standardization of U.S.S.R. Fertility Data

Just as mortality is sometimes erroneously measured by the crude death rate, it is not uncommon to see measurement of fertility attempted through the use of the crude birth rate. Here, too, proper analysis requires at least age-specific fertility rates (births to mothers of a given age, divided by total women in the population in that age group), and more adequate analysis can be made if consideration is given also to marital status and birth order.

When, however, data on births by age of mother are not available, but rather only the total female population by age groups is at hand, the only possible analytical procedure is standardization. If data were available by marital status and birth order, further standardization could be done. But, in any event, standardization by age is of some significance.

The method of standardization of crude birth rates is the same as described for crude death rates, except that only the female population is considered.

Actual experience of the United States in 1956 has again been used as the standard (7b). The basic data of this analysis and also the estimated births that would have occurred in the U.S.S.R. population if U.S. fertility had applied are shown in table 2. The resulting crude birth rate is 32.69 per 1,000 (6,516,400 births divided by 199,336,000 population), or 31 percent above the reported U.S.S.R. rate of 25.0 per 1,000. The relatively young age distribution of the U.S.S.R. population is clearly responsible, in considerable part, for the moderately high crude birth rate currently reported by that country. It may also be inferred that,

Table 2. Application of U.S. fertility rates to U.S.S.R. population, Jan. 1, 1956

[Population and births in thousands; rates per thousand]

Age group (years)	U.S.S.R. female population ¹	U.S. 1956 fertility rates ²	Estimated U.S.S.R. births
10-14.....	7,685	1.0	7.7
15-19.....	10,653	94.2	1,003.5
20-24.....	8,057	251.3	2,024.7
25-29.....	10,096	195.5	1,973.8
30-34.....	8,573	116.4	997.9
35-39.....	6,359	60.3	383.4
40-44.....	7,452	15.9	118.5
45-49.....	6,918	1.0	6.9
Total.....	65,793	-----	6,516.4

¹ Reference 5.

² Reference 7b.

on the whole, fertility in the Soviet Union is 24 percent lower than in the United States.

U.S.S.R. Fertility and Family Allowances

Another indication of the level of U.S.S.R. fertility may be found in data from the country's family allowance program. Under this program, monthly payments are made to children aged 1 through 4 years who are of fourth or higher order of birth, the amount varying according to the birth order. At the end of 1956, 3,312,000 children were reported to be receiving such allowances, representing 17.9 percent of children in the country aged 1-4 years, as estimated by the author on the basis of data on total population and births presented by Biraben (6). The corresponding figures for the end of 1950 were 3,079,000 children receiving allowances, representing 19.2 percent of the children aged 1-4 years.

Although census data on children by birth order are not available for the United States, adequate and proper analysis can be made by considering birth-order data reported to the National Office of Vital Statistics. For 1953-56, births of the fourth and higher orders were 25.1 percent of all births in the United States, significantly higher than in the Soviet Union. The following table compares the figures for the two countries, with subdivision by birth

order, showing the ratio of children of a particular birth order to total children:

Birth order	Ratio U.S. to U.S.S.R.		
	U.S.S.R. (percent)	U.S. (percent)	U.S.S.R. (percent)
1 -----	8.6	11.1	129
2 -----	4.6	5.8	126
3 -----	2.5	3.2	128
4 and higher -----	2.2	5.0	227
Total -----	17.9	25.1	140

The higher birth orders in the United States are clearly more prevalent than in the Soviet Union. This finding confirms the results of the other analyses; that is, that fertility is significantly higher in the United States than in the U.S.S.R.

Summary and Conclusions

The Soviet Union frequently makes the claim that its mortality is the lowest in the world, whereas in the past it was extremely high. These statements are made on the basis of the crude death rate, which is currently reported at a relatively low level, for 1956 some 20 percent lower than the United States. However, the Soviet Union has also reported figures for the expectation of life at birth, which, for 1956, are about 4 years lower than for the United States, for both men and women.

Similarly, the only figures available as to fertility are the crude birth rates. On the basis of these, the U.S.S.R. claims a high fertility rate. Actually, in recent years, the Soviet crude birth rate has been well above that of most Western European countries, but virtually the same as for the United States.

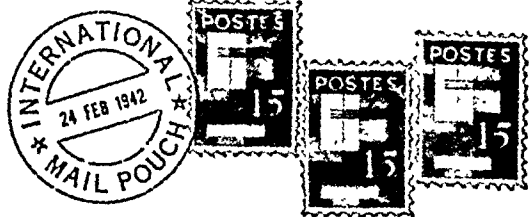
This paper has analyzed mortality and fertility in the U.S.S.R. on the basis of standardization by age. This procedure is especially necessary in dealing with data for the Soviet Union because of the unusually young age distribution of the population. The resulting analysis indicates that Soviet mortality as reported, after taking into account age and sex distributions, is about 25 percent higher in the aggregate than that of the United States, while fertility is about 24 percent lower.

Analysis tends to confirm to a considerable extent the reliability of the reported Soviet figures on expectation of life at birth, assuming the accuracy of the reported crude death rates. The differential in life expectancy between the United States and the U.S.S.R., for each sex, currently amounts to about 4 years (in favor of the United States).

Considerable improvement in mortality in the U.S.S.R. has undoubtedly occurred since the pre-World War II period. This same trend, however, has been present in many other countries throughout the world that had relatively high mortality in the past.

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Milk Week

Milk Week for all Ceylon ended on Independence Day, February 4, 1959, with 2,500 school children marching in a parade and pageant in Colombo. Approximately 70,000 people saw a physical education demonstration and floats in Independence Square. Similar demonstrations were held in other parts of the island.

During Milk Week schools held poster competitions and exhibited health and nutrition work. Posters, film shows, radio, and newspaper stories focused public attention on the value of milk and its availability through CARE in the schools.

The celebration was part of a long-range effort to improve nutrition in schools and homes and to encourage use of home and school gardens.

—PHILIP RILEY, *public health education adviser, U.S. Operations Mission, Ceylon.*

Training Medical Students

Quinta Normal Health Center will serve as a demonstration teaching center for medical students and as a demonstration of a comprehensive integrated health program. Chile's National Health Service has assigned a section of the center's building to the Medical School of the University of Chile for carrying out this project of the school's division of preventive medicine and public health.

The medical school will assume responsibility for the health of 2,000 families in one area served by the center. Two pediatricians, an internist, and a psychiatrist from the school; and two pediatricians, an internist, an obstetrician, two nurses, and two social workers from the National Health Service will staff the project.

When a birth occurs in a family living in the area, the mother and child will be given maternal and child health services, and, through them, the rest of the family will be reached. As they provide hospital, outpatient, and home care, medical students will learn about social and economic as well as medi-

cal and public health problems. Students are responsible for specific families during their studies in preventive medicine and public health.

—G. HOWARD GOWEN, M.D., *chief, division of preventive medicine and public health, U.S. Operations Mission, Chile.*

Courses for Rural Physicians

Nearly 300 rural physicians have taken postgraduate courses at the Institute of Rural Occupational Medicine and Rural Health in Lublin, Poland. The 3- or 4-week courses were started in 1952 after investigations revealed that rural physicians had inadequate training in sanitary and preventive methods.

The institute offers a course stressing hygiene and prophylaxis, a general clinical course emphasizing traumatology and the more common diseases of the rural environment, a course in laboratory and X-ray techniques, and a course in internal medicine and pediatrics focused on diseases associated with rural living and working conditions.

The institute has planned the curriculum for a fifth course, which deals with epidemiology and the anthroponozoonotic diseases, to be offered to physicians and veterinarians, and hopes to start courses for rural nurses and rural health instructors.

Some 300 rural physicians as well as many scientists and specialists in rural health service organizations attend the annual nationwide conference of rural practitioners organized by the institute. Since 1957 the section of rural medicine of the Polish Medical Society has assisted in organizing these conferences.

—DR. Z. KAWECKI, *chief, methods organization section, State Institute of Rural Occupational Medicine and Rural Health, Lublin, Poland.*

Fluoridation

Public water supplies are being fluoridated, as a dental health measure, in Penang (234,000 population), Federation of Malaya, and in the State of Singapore (1,467,000 population). Fluoridation has been approved also for the public water supply of Hong Kong (2,600,000 population).

—DR. A. KARIM, *assistant director of medical services (dental), Ministry of Health, Federation of Malaya.*

By Leroy E. Burney, Surgeon General,
Public Health Service, August 28, 1959

Live Poliomyelitis Vaccine Status

The present status of attenuated live poliovirus vaccines has been reported by the Public Health Service's Committee on Live Poliovirus Vaccine, headed by Dr. Roderick Murray, chief of the Service's Division of Biologics Standards.

The committee has reviewed the rapidly accumulating data on the development and field use of attenuated live poliovirus vaccines and has considered the initial problems involved in the preparation of provisional specifications for their production. It has been given responsibility for evaluating all available information, for determining what additional information is needed, and, where necessary, for initiating studies to supply the answers to questions that must be resolved before licensing can be recommended.

If energetic efforts are continued to find answers to the remaining technical questions concerning safety, effectiveness, and manufacturing procedures, one or more of the three vaccines now being proposed may be under production within 1 to 2 years. Meanwhile, in the Salk vaccine there already is at hand a potent weapon whose value and effectiveness have been proved. I continue to urge all persons, particularly those under 40 years of age, to complete their series of Salk injections so that no one will remain unprotected at the time of the next poliomyelitis season.

The status of live poliovirus vaccine as reviewed by the committee follows:

1. Three sets of attenuated poliovirus strains have been proposed for use as oral vaccines. The Sabin strains (Dr. Albert Sabin, University of Cincinnati) have all had extensive field trials in Eastern Europe, Mexico, and Singapore. The Lederle strains (Dr. Herald Cox,

Lederle Laboratories) have been widely used in Latin America. The Koprowski type 1 strain (Dr. Hilary Koprowski, Wistar Institutes, Philadelphia) has been used in a large trial in the Belgian Congo. However, no significant amount of field information is available concerning Koprowski's type 2 strain, and only limited information is available in relation to his type 3 component.

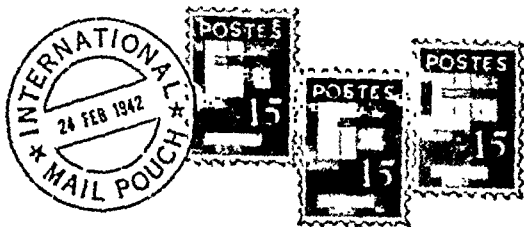
2. There is considerable difference in the neurovirulence or damaging effect on nerve cells for monkeys of the three sets of strains as determined by intrathalamic and intraspinal inoculation. On this basis, the Sabin group has an advantage over the others, but none of these strains is completely nonvirulent when inoculated into monkeys by the intraspinal route.

3. No evidence has been reported to indicate that any of these vaccines produced any harm to the individuals to whom they were administered. The thoroughness with which the observations were made has varied in different studies.

4. In some studies the ability of these strains to multiply and thus produce antibodies is less than could be expected on theoretical grounds. Apparently a number of factors operate in the field which may prevent alimentary infection and the subsequent development of immunity.

5. A number of workers have reported that virus excreted by vaccinated individuals has shown increased neurovirulence for monkeys. There is considerable disagreement among investigators as to the significance of these reversions in virulence.

6. Field experience with any strain to date cannot be interpreted as affording reasonable



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Courses

for

Nursing Home Personnel

The advent of chronic and degenerative diseases as major health concerns has ushered in an era in medical care that requires, more than ever before, the personal and active cooperation of many persons. Often these people have the desire and ability to participate in caring for the senior citizen but do not possess the skills required to do so.

Since the fundamental goal in public health is to make available the best health protection and guidance to all, health departments have a role in the training of people caring for the chronically ill and aged. Throughout the country various State and local health departments have assumed this responsibility and are offering training courses for nursing home personnel.

As a contribution to this effort, *Public Health Reports* has assembled three articles dealing with some of the techniques that may be used in training personnel to care for the chronically ill and aged in nursing homes and homes for the aged.

The techniques described in these articles are not panaceas. They merely represent three approaches to training that are being tried. It is sincerely hoped that they will be of assistance to those who are interested in training personnel for nursing homes and homes for the aged.

proof that the community of nonvaccinated persons will be free of danger from possible reversion of virulence in excreted virus under a great variety of readily anticipated circumstances. This is one of the most important unresolved problems.

7. There is evidence which indicates that under some circumstances the simultaneous administration of all three types of virus may be effective.

The committee reported the following major problems which remain to be solved before definitive decisions can be made regarding licensing:

1. The significance of increased neurovirulence for monkeys of virus excreted by vaccinated individuals.

2. The demonstration of adequate measures of effectiveness of live poliovirus vaccines in field trials which, to be definitive, must involve

large population groups. The capacity of the virus to spread among contacts means that in such a controlled field trial some nonvaccinated controls will become infected and thus presumably become immune—a complicating factor in such a study.

3. The development of standards to determine the possible presence or absence of stray agents in the vaccine. More than 40 simian agents, including B virus, have been encountered in the routine testing of killed poliovirus vaccine. These are derived from the monkey tissues used. Little is known of their pathogenicity for man except B virus, and even for this the minimum infecting dose is not known.

4. The establishment of carefully designed and evaluated studies to demonstrate the production of specific antibodies in 90 percent or more of inoculated susceptibles in order to assure the potency of such vaccines.

First 20 Years of the Crippled Children's Program

The number of handicapped children served annually by the crippled children's program of the Children's Bureau increased from 110,000 in 1937, when the program began, to 313,000 in 1957.

Between 1950 and 1957, the number of children who received care and treatment for epilepsy alone increased 387 percent. According to the Children's Bureau, changes in the attitude of the public toward epilepsy coupled with drugs which now can largely control epileptic seizures have made it possible for more and more children so handicapped to become contributing members of society. Those treated for eye conditions increased 234 percent, for diseases of the nervous system and sense organs, 162 percent, and for congenital malformations, 80 percent.

In 1950, only about 2,200 children with congenital heart malformations received serv-

ice in the crippled children's program. By 1958 because of rapid developments in diagnosis and treatment of congenital heart disease, more than 12,000 such children were helped.

At the same time, the crippled children's program is helping to establish and expand programs for services to child amputees. The Bureau has received reports from 30 States which show that they have slightly more than 2,000 children who lack one or more limbs or parts of limbs, and who can benefit from prosthetic devices and training.

At the beginning of the crippled children's program, children stayed in the hospital an average of 43.6 days. In 1957, they were staying an average of 24.4 days. From 1945 to 1957, the average cost per hospital-day went up almost 200 percent, from \$8.95 in 1945 to \$26.81 in 1957.

from the manual, the rapid training method of teaching was used to instruct 51 administrators and 133 nursing aides from 71 homes during the project period (January 1–December 31, 1958). After the study was completed the State continued the course, and an additional 186 aides and 55 administrators have been trained. In 1958 Oklahoma had 554 licensed nursing homes with a total of 7,738 beds employing an estimated 1,200 nursing aides but only 14 graduate registered nurses and 35 licensed practical nurses. The division of public health nursing of the Oklahoma State Department of Health administered the pilot study, and an appointed State advisory committee assisted at the State and local levels.

The Public Health Service has also helped nine other States in developing nursing aide programs. In two of the States registered nurses received instruction in the rapid training method of teaching in teacher-training workshops.

The rehabilitation training program for nursing home personnel being conducted in Illinois under joint Federal, voluntary, and State auspices is an outstanding example of what can be done in inservice instruction. Through intensive training for all personnel in the nursing home this project is endeavoring to ascertain whether effective rehabilitation services can be given to the chronically ill and aged in a nursing home setting. (See pp. 989–994.)

In the Illinois program, a training team composed of two rehabilitation nurses and one occupational therapist goes into the nursing home and works with the staff demonstrating and teaching the techniques to be employed in caring for patients. The team works in the home for approximately 2 months, giving a 1-hour lecture and 7 hours of demonstration daily. The Peoria Institute of Physical Medicine and Rehabilitation provides medical direction.

In evaluating this project one should consider first that it is directed toward a concept and not toward a particular group of employees. Every person working in the home, including the administrator, participates.

Second, it is primarily a teaching and training enterprise, although it does include some patient care. It was considered desirable that

Red Cross Helps Train Nursing Home Aides

Authorized instructors in the Red Cross home nursing program will train paid nursing home aides employed in nursing homes, according to an agreement concluded by the Public Health Service with the American National Red Cross and the American Nursing Home Association.

This cooperative program will be an additional resource for public, private, and nonprofit nursing homes throughout the United States in their efforts to train nursing aides in order to improve the care of their patients.

Nursing home operators are also permitted to take the course since many give nursing care. Because they are administratively responsible for patient care they need familiarity with nursing procedures.

Course enrollments may range from 10 to 14 students, the hours for each course from 20 to 30 hours, and the course content will be adapted to the nursing home situation after the instructor visits the home.

For the students, the textbook is "How To Be a Nursing Aide in a Nursing Home," by Dorothy E. Reese of the Public Health Service; and for the instructor, the guide is "Care of the Sick and the Injured," published by the American Red Cross.

the personnel be trained in the environment where they worked and where the techniques that would be most effective in each home could be adapted and adjusted to the needs of the patients in the specific home.

The program has achieved excellent results and has been enthusiastically received by the participants. Other States are considering similar programs.

Many States have found it desirable to work with all the personnel providing care in nursing homes rather than just with nursing aides. In these States it was felt that only through educating the entire staff in certain basic concepts could the best results be obtained.

An important factor in the success of all three types of instruction has been the interest and enthusiasm of the local physicians, nurses, therapists, and others directly and indirectly caring for patients. It is they who will carry

Filling Training Needs

BRUCE UNDERWOOD, M.D.

THE LACK of trained personnel is not unique to nursing homes. Perhaps the shortage appears to be more pressing in this than in other health fields because of the great increase in the number of nursing homes in recent years.

What are the facts that highlight this shortage?

There were approximately 25,000 nursing homes containing 450,000 beds in the United States in 1954. Some 7,000 homes were in the skilled nursing home category. The average age of nursing home residents was 80 years, and about half of them were severely incapacitated in one way or another.

Of the 66,000 persons the homes employed to care for these ill and disabled persons, 39,000 could be classified as full-time nursing personnel who performed tasks requiring nursing skill of one kind or another. About 15,000 were either full-time registered nurses or licensed practical nurses. About 60 percent were nursing aides who have received little or no formal training. Only one-third of the homes have either a registered nurse or a licensed practical nurse on their staff.

These figures show that the present staffing of nursing homes with registered nurses and licensed practical nurses is inadequate. We must also realize that, generally, the nursing aides have not been trained as they should be.

Nor will the need for training become less

important. If present projections bear out, we can expect our aging population to number more than 21 million by 1970, and 5 percent of them will require institutional care of one sort or another. Not only will the number of older people increase but their demands for institutional type care can be expected to grow, as insurance and other methods of payment for such care increase. Also, the trend toward living in small homes and apartments will cause more elderly citizens to seek institutional care, since they are unable to live with relatives, as many have in the past.

The problem is twofold; first, to obtain personnel to meet the increasing demands being placed on nursing homes for care, and second, to train them. At present, there is recognition that at least three types of instruction may be applicable in training nursing home personnel: accredited courses in vocational and other educational institutions; special workshops, institutes, and training sessions at central locations outside the nursing home; and training within the home.

Many States have found that the first type of instruction is effective in training licensed practical nurses, food service managers, and other similar personnel.

An example of the second type is a pilot study conducted by the Chronic Disease Branch, Public Health Service, and the Oklahoma State Department of Health to test the effectiveness of the manual entitled "How to be a Nursing Aide in a Nursing Home." This handbook was developed by the Division of Nursing Resources, Public Health Service, published in 1958, and is being distributed by the American Nursing Home Association.

With subject matter for the course drawn

Dr. Underwood is nursing home consultant, Chronic Disease Branch, Division of Special Health Services, Bureau of State Services, Public Health Service. The article is based on a speech given at the annual meeting of the Kentucky State Association of Nursing Homes in Lexington, April 29, 1959.

Instructing Nursing Home Personnel in Rehabilitation Techniques

JOHN A. HACKLEY

IN ILLINOIS, as in most other States, complete and intensive rehabilitation services are limited to a few urban areas, notably Chicago and Peoria. Elsewhere in the State public and private nursing homes are expanding rapidly to care for chronically ill and disabled persons. Some of these persons at other times and under other circumstances would have been hospital patients. But hospital care for such patients is frequently inappropriate, unavailable, or economically prohibitive, or no agencies are available to help them obtain hospital care.

In many sections of Illinois hospital care is not available in the patient's community, and the local physician must rely upon the nursing home for inpatient care when care at home cannot be provided. The shrinking size of private dwellings and the dwindling number of family members available to provide home care has further increased the use of commercial and county nursing homes for both private pay patients and recipients of public assistance.

Likewise, there is frequent evidence of the need for general hospitals to concern themselves more with measures to prevent the development of conditions which may require nursing home care after a hospital stay.

Mr. Hackley is coordinator of the rehabilitation education service of the Illinois Public Aid Commission, Peoria. The project is supported by grants from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, the Forest Park Foundation of Peoria, and the Illinois Public Aid Commission.

The vocational rehabilitation of residents of nursing homes presents several significant problems. For instance, in the average Illinois community there is often little knowledge or appreciation of the philosophy and techniques of rehabilitation and the vocational potentials that may emerge from physical rehabilitation. Similarly, there is often little knowledge of the interests or services of the Federal Office of Vocational Rehabilitation and its counterparts in many of the States.

The Office of Vocational Rehabilitation, the Forest Park Foundation of Peoria, through the Peoria Institute of Physical Medicine and Rehabilitation, and the Illinois Public Aid Commission joined forces to conduct a 3-year research demonstration project, the rehabilitation education service. Begun in February 1957, the project, the first of its kind in the United States, proposed to look for the answers to these questions.

- What are the rehabilitation needs among patients of a selected group of public and private nursing homes?
- Can the existing staffs of these homes, in cooperation with local physicians and services in the local community, meet these needs if they receive adequate training in the philosophy and techniques of rehabilitation?
- What kind of training can be developed to provide staffs with a knowledge of rehabilitation techniques and to increase their appreciation of the philosophy of physical and vocational rehabilitation?
- What kinds of teaching materials can be developed that other agencies and schools can

the responsibility for continuing and expanding programs of improved patient care. Without their help most training programs probably will fail to achieve their objectives.

Various professional schools should also be encouraged to participate in training programs for nursing home staffs. The assistance these schools can give is invaluable.

A portent of the schools' interest in this field was the workshop on chronic disease and nursing service conducted by the division of nursing education, Teachers College, Columbia University, in New York City, June 8-19, 1959. Participants were 15 graduate nurses selected because of their knowledge and nursing experiences in chronic disease and aging, educators and administrators from the faculties of several schools of nursing, and resource consultants.

The nurses appraised and organized their knowledge and experience, and the faculty members developed a plan for the integration of this knowledge into the curriculum of schools of nursing. A report on the workshop will be published this year.

However, the fundamental dilemma is how to organize a training program adapted to the needs and circumstances of an individual community. In my opinion, the first step might be the formation of a statewide advisory committee. It should not be too large but should have representatives from any or all of these interested State groups: hospital and nursing home associations; health, welfare, licensure, and vocational education agencies; medical, dental, nursing, and other professional associations; and the American Red Cross and other voluntary agencies.

This statewide committee can advise on such matters as what program is desirable, how it can be implemented, policies and procedures to be followed, financing and coordination of the training effort, and formation of local advisory committees.

The second step might be to set up local ad-

visory committees. Their membership should also be limited but representative of all the vitally interested official and voluntary agencies as well as the press and interested lay groups.

We believe it is essential to assign a qualified, full-time person to act as coordinator for the statewide training program. His responsibility is to implement the committee's recommendations and to coordinate all aspects of the program. Similarly, each local committee should designate an individual who can work in the community and also coordinate local activities with the State program.

The success or failure of a training program often rests with the local advisory committee that, with its coordinator, actually carries out the training. Therefore, it is important that the committee considers these aspects of the local training program.

- The need for training and whether it should be formal, informal, or on-the-job instruction.

- The number, size, and location of the homes and the number and type of personnel they employ.

- The interest and concern of the homes' administrators, health, welfare, and licensure personnel, and medical and nursing professions.

- Securing a sufficient number of teachers and consultants.

- Methods of financing and various other factors that are essential to such a project.

It is hoped that some of these suggestions will assist the promotion of training programs to improve the care of persons in nursing homes. Ultimately, improved care for them depends on the interest and concern each of us has for their well-being. We can establish and maintain good training programs for nursing aides and we can effectively engage in many other activities in behalf of residents of nursing homes and homes for the aged only if we focus on the needs of the individual patient.

tend. These lectures cover the following subjects:

- Philosophy of rehabilitation and rehabilitation nursing.
- Occupational therapy.
- Patient approach and motivation.
- Body alignment, bed positioning, deformities, and contractures.
- Body motion and exercise.
- Activities of daily living and training, including devices.
- Bladder and bowel control and training.
- Ambulation activities.
- Passive range of motion, group exercises.
- Personal hygiene, speech and hearing rehabilitation.
- Recreational, functional, and group activities.
- Prevocational services.
- Physical environment.
- Social services.
- Community and volunteer programing and services.
- General nutrition.
- Role of the family in a patient's rehabilitation.
- Resource material for the nursing home staff.

Team members spend most of each day in demonstration, return demonstration, and bedside work with individual members of the nursing home staff. We have found that nursing home personnel tend to be uncomfortable when dealing only with concepts, and that it is most effective to teach specific, concrete techniques and to let philosophical concepts of rehabilitation emerge as lecture material is put into practice.

The length of the team's stay depends largely upon the size of the nursing home and the number of persons to be trained. In practice, the training period has averaged approximately 6 weeks; the range has been from 4 to 8 weeks.

One nursing home staff member, assigned by the administrator, is trained by the occupational therapy consultant to be the activities director of the home. The activities director has primary responsibility for planning and conducting recreational and diversional programs, recruiting, training, and supervising volunteers, and for promoting community-related activities. The activities he heads embrace all aspects of occupational therapy except prevocational testing and functional work.

The project team presents a list of equipment for rehabilitation nursing and occupational therapy which the nursing home is supposed to provide. Patterns are included for items on the list which the home can make. The rehabilitation nursing equipment is limited to such aids as footboards, sandbags, and pulleys. Their total cost is approximately \$7. The tools, equipment, and supplies requested for starting an occupational therapy program that includes 20 basic crafts and innumerable recreational program materials cost approximately \$32.

Adaptations for toilets and tubs, parallel bars, and similar equipment are not on the list of requested items. We prefer to demonstrate various substitutions or less expensive improvisations which will help the home realize the value or need for such equipment. If the home believes that various pieces of equipment will be useful, we then provide patterns so they can be constructed as inexpensively as possible.

When the rehabilitation program has been operating for 1 year, the project team which conducted the initial training and made the monthly followup visits returns to the home for a 2-day exhaustive evaluation. Several weeks in advance, the administrator and staff are notified of the evaluation and of certain considerations to be discussed at staff meetings and during the evaluation.

Afterwards, the team discusses with the administrator the program's strengths and weaknesses. The team then remains in the home several days to give short-term intensive training to correct the weaknesses found during the evaluation.

Experience seems to confirm that providing training within the facility is most practical. The administrator and staff receive the same lectures and participate in the same discussions, thus improving communication between them. Clinical experience within their own institutions permits the staff to adapt training to the patients they routinely serve and to recognize and deal with problems and approaches in patient motivation.

Inasmuch as rehabilitation services call for a marked change in the nurse's attitude toward patient care and an appreciation of the importance of activities in the total treatment of the

use to increase the competence of nursing home staffs to share in vocational and physical rehabilitation?

Framework of the Project

The Peoria Institute of Physical Medicine and Rehabilitation provides medical supervision for the project. A grant from the Forest Park Foundation enables the director of research and education of the institute to devote 1 day a week to such activities as visits to cooperating nursing homes, meetings with their staffs, direct medical supervision of the project staff, and, upon request, giving more detailed interpretation to the patients' attending physicians.

The project staff consists of four rehabilitation nursing consultants, two occupational therapy consultants, and a supervisor. Two nursing consultants and an occupational therapy consultant, with one of the nurses as supervisor, form a training team.

Because the rehabilitation education service is a staff training program rather than a direct service to patients, the project's particular combination of professional staff does not include a physical therapist or a vocational counselor. The teaching of physical therapy is confined to aspects which the various professions involved have agreed can be legitimately carried out by nurses properly trained and supervised in rehabilitation. Therefore, the teaching embraces such care as passive range of motion exercises and gait training which the nursing home personnel can carry out within the framework of a nursing home program. However, if intensive physical or other therapy for some patients seems indicated, homes are encouraged to employ a physical therapist part time, or, at the request of the attending physician, to obtain the services of a physical therapist who can treat a patient.

Experience seems to indicate the need for a medical social worker on the project staff in the near future. Most nursing homes are not prepared to provide professional casework services for patients or families, but certain techniques for interviewing and other intake procedures are not only useful but needed in many homes. Certainly, basic casework concepts are invaluable to nursing home personnel,

particularly in patient approach and motivation. However, it is our opinion that a patient who needs the integrated services of all the disciplines associated with rehabilitation should be in a rehabilitation center.

During the first 4 months of the project the staff, under the supervision of the institute, designed the materials and procedures to be used in the nursing homes. Fieldwork began June 15, 1957, and we are now conducting the program in the 36th and 37th cooperating homes. The homes have ranged in size from 15 to 243 beds.

The applicant nursing home must meet certain criteria. The administrator or governing body of the home must voluntarily request participation. The home must be currently licensed by the Illinois Department of Public Health. A full-time registered nurse or licensed practical nurse must supervise nursing. The home must accept public assistance patients and currently have such patients.

Approximately 20 percent of the eligible nursing homes in Illinois have applied for the service. The applications on hand are somewhat fewer than the initial number, but the present backlog necessitates a waiting period of approximately 6 months.

After receiving an application from a nursing home, the coordinator of the project visits the home to meet the administrator and staff and to explain in detail the content and procedures of the rehabilitation education service. The project staff then discusses the application and informally consults the regulatory agency to ascertain the home's administrative attitudes, atmosphere, and history of patient care. If acceptance of the application seems indicated, the training team visits the home to work out the details of introducing the service.

Conducting Training

In conducting the training, a project team spends 4 days a week for 4 to 7 weeks at the cooperating home. Mondays of each week are reserved for monthly followup visits to homes that have already received the service. During the training period, daily 1-hour lectures are held for all persons on the staff who are in contact with patients. If necessary, the lecture is repeated so that the entire staff can at-

that they appreciate more the role of occupational therapy in nursing care. They believed that their patients have gradually accepted the rehabilitation philosophy and have willingly accepted responsibility for increased self-care.

The nursing home personnel appraised as the program's two greatest benefits their own change in attitude toward goals for their patients and their acceptance and understanding of the basic principles of rehabilitation. They concluded that programs such as the one established by the project were feasible for a nursing home of any size, but felt that the program's intensity and scope depend upon individual attitudes of the administrator and the nursing personnel.

The administrators of 18 cooperating homes assisted in an exhaustive evaluation of the training content and methods of operation of the rehabilitation education service. For this evaluation, the project staff interviewed orally the administrator, the nursing staff, and selected patients of the 18 homes. They were asked 35 questions covering all aspects of the rehabilitation program.

Some generalizations regarding such training programs were drawn from their answers.

- It is essential that the program be requested voluntarily and desired by the home if the training is to be effective and the program continued.

- The staff must have stable employment, be highly motivated, and be experienced in nursing service if maximum benefit is to be derived.

- A training program can provide the staff with nothing more than specific tools and techniques to be used in medically prescribed rehabilitative care of patients.

- Most problems for staff members were associated with nursing aspects of the program rather than occupational therapy or activities, possibly because in nursing, outmoded techniques and procedures which have become habitual must be unlearned, but occupational therapy is new to them and is not resisted because of tradition or long-established practice.

- Rehabilitation services can be built best upon the soundest basic nursing possible. An institution with good administrative procedures and personnel policies and acceptable in-

take policies and procedures is the most promising setting for such a program.

- The cooperating homes considered the cost of such training and the maintenance of the program reasonable. The greatest expense was the staff time devoted to training sessions during the initial phase of the program. Generally, the cost for equipment and basic preliminary supplies has averaged about \$40 per home. The homes have found various ways of absorbing the cost of materials for continuing occupational therapy. Most frequently, they use income from salable items to purchase additional supplies, or philanthropic groups and service clubs in the community supplement the crafts budget with donations.

Problems

Those concerned with the services of nursing facilities and the rehabilitative care of older patients should remember that a program such as the rehabilitation education service can never solve all problems. There is no question in the minds of the project staff but that the scope, quality, and philosophy of service have been markedly changed in each nursing facility in which the program has been conducted. But staff education cannot be expected to meet such problems as placement of patients in inappropriate facilities, conflict between high standards of service and low rates of payment, lack of counsel and casework services for patients and their families, and lack of appropriate facilities for discharged patients.

However, such projects as this are in a relatively ideal position to observe the frequency of such problems and indicate possible useful tools in exploring and developing solutions. Also, the project serves as an excellent unit for the finding of patients in need of certain facilities and services. The project staff constantly encourages nursing homes to see themselves as casefinding units with regard to patients, their families, and overall community needs.

Although stability of staff in the cooperating homes is extremely difficult to measure adequately, our observations indicate a trend toward reduced turnover in some facilities after such a training program has started. In others, continued turnover tangibly affects the efficiency of the rehabilitation services that

patient, during full-time association with the staff the teaching team can demonstrate how the philosophy of rehabilitation must permeate every nursing activity extended to the patient.

Also, this approach creates an excellent opportunity to interpret further to physicians the nature and scope of the nursing home's services. Most patients in the cooperating homes have their own physicians, and we require the physician's prescription before a patient may participate in any phase of a rehabilitation program. Finally, in this setting the teaching staff can identify problems of patient care in the specific home and assist the administrator in working out a plan of care suitable for the individual patient in terms of staff capabilities.

Results

We are frequently asked our goals for a nursing home patient. Since this is not a treatment program but a training program for nursing home staff, goals are for the staff rather than the patient. No one can delineate absolute goals for an individual patient; his potential and response to treatment, frequently unpredictable, govern his rehabilitation.

In general, the patients' responses to treatment have fallen into three general categories. Approximately 5 percent of the initial patients indicated adequate potential to warrant a referral to the Illinois Division of Vocational Rehabilitation. However, this percentage is diminishing. Response to rehabilitation measures has resulted in the discharge or the pending discharge from the nursing home of approximately 25 percent of the patients. Rehabilitation measures have brought increased self-care and independence within the nursing home to about 60 percent of the patients. The attending physicians of the remaining 10 percent did not prescribe participation in rehabilitation activities. Most of these patients had severe cardiac disorders or terminal illnesses.

Nursing homes which have had this training are being used for maintenance rehabilitation or the completion of rehabilitation of some patients, permitting their early transfer from the Institute of Physical Medicine and Rehabilitation. The improvement of some patients would allow their return to the community, but they are unable to because they lack financial

resources, the family is unable to fulfill its role in the situation, or community resources are inadequate.

In assessing the training, we find that every moment spent in a home is a demonstration of our conviction of the need and efficacy of rehabilitation. Indirectly, we see a new motivation for the staff stemming from the improved morale and health of the patients and a new reason for both patients and staff to do more than was formerly considered not only enough, but actually was thought to be good care.

Similarly, there emerges that almost inevitable change in attitude that goes hand in hand with the consciousness of improved technical skills, especially if the result is happier, healthier patients. This attitude is evident in comments from cooperating homes. None has expressed disappointment with the conduct of the training or the continuing program. However, on innumerable occasions staff members have said that it is a slow process for them to incorporate the philosophy of rehabilitation in all aspects of administration, planning, and care.

Frequently, staff members are discouraged because only a small number of the present patients can benefit dramatically from rehabilitation services. We endeavor to point out that if work is begun with a patient 5 to 10 years after the initial insult, there is rarely an opportunity to see as graphic a demonstration of the benefits of rehabilitation as with newly admitted patients. On monthly followup visits the teams have found that nursing home personnel are most eager to demonstrate their work with newly admitted patients and the gains they have seen these patients make.

Evaluations

Administrators and staff of the first 10 homes in which the annual evaluations, described previously, were held indicated what they had gained from the project. Nursing staff members said they now know more about caring for patients, especially the patient with hemiplegia, a fracture, or arthritis. They felt that their training has also improved the quality of the basic nursing care they give to patients.

Administrators and staff members indicated that they are much more aware of patients' needs for social activities and motivation, and

Training Nursing Home Administrators

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THE TRAINING of nursing home administrators and staff is recognized as an essential component of programs for improving the care of patients in such institutions. Although inspection and regulation have proved of great value, a considerable area of nursing home operation remains outside the scope of legislation. Various nursing home associations and Federal, State, and local agencies have developed training courses and materials (1), and the National Conference on Nursing Homes has recommended development of training programs (2). In Missouri, the St. Louis County Health Department has conducted a training program for administrators of these homes.

A description of the training project has been published (3). We present here a brief review of some pertinent general aspects with a summary of the program's development.

In reviewing the St. Louis program, we do not attempt to evaluate degree of success in achieving the ultimate product, that is, the improvement of services to residents. It would be difficult to separate the effects of a formal training program from those of other activities, such as official inspection, which also influence patient care in nursing homes. Also, there were major legislative and regulatory changes during the course of the program.

There are 57 nursing homes in St. Louis County providing 2,500 beds. One of the

homes, operated by a church, is not included in the analysis. In comparison with nursing homes throughout the Nation, those in St. Louis County are reasonably typical. Data on the age distribution of residents, and their medical and nursing service needs, as well as financial support, show that the county is in the median range for the United States.

When the department developed an intensified inspection program in 1954, it quickly became clear that the nursing home administrator's education or experience usually did not include medical or other professional training. It was also clear that other information on operation of a physical plant and administrative techniques, such as cost accounting, might be discussed profitably in an educational program. Certainly, the administrator needs many skills which he has little opportunity to develop except by unguided experience. It seemed desirable therefore to develop a series of educational meetings with the primary purpose of instructing nursing home administrators.

Educational Meetings

To help plan the educational meetings, a policy committee was formed with representation from two independent nursing home associations and from homes not participating in either association. Also on the committee were medical, nursing, and sanitation personnel of the health department. Topics for the programs were selected by the committee, which recommended that 2-hour sessions be held in the afternoon once a month. Seventeen meetings were held, the first in June 1956, and the last in January 1958.

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have been started. Eventually, a plan may be devised to give new staff members the same intensive training the rest of the personnel have already received.

The loss of a home's activities director would critically impair this phase of the rehabilitation work. During the remaining demonstrations, we plan to try to prevent or solve this possible interruption in a home's program.

In spite of the growing prominence of nursing homes in the total medical care spectrum of the community, far too few administrators or medical personnel appreciate adequately the appropriate role of nursing home care in rehabilitation. In the nursing home lectures, community interpretations, associations with related services, and discussions with patients' families, we stress the totality of services needed for realistic rehabilitation planning—social, economic, vocational, psychological, and physical. No other area of concern for people involves such a multiplicity of patient needs.

Because of their profit-making nature, proprietary nursing homes frequently are reluctant to consult with community agencies or to request direct services from them for patients. The rehabilitation education service staff assists these homes in contacting pertinent agencies such as the Illinois State Division of Vocational Rehabilitation and public and private agencies and establishing close working relationships.

This reluctance may perhaps be explained by the similar feeling of some agencies and programs to serve nursing homes which are operated for a profit. In some areas, the nursing home, as a medical care facility of the community, still does not enjoy broad understanding of its role in the care of the chronically ill, nor is it afforded its rightful position of respect by professional and lay people.

Conclusions

Dr. Theodore G. Klumpp, in his paper entitled "Promotion of Health Maintenance and

Restorative Services," stated, "The achievement of absolute and unquestioned scientific proof of the many basic facts concerning the aging process will take time, perhaps years and generations in the life of man. Are we to sit by and do nothing until the pieces of information are collated and nailed down as solid facts or are we justified in taking the best we have at the time as working hypotheses and apply them to useful ends? I think we are."

We feel the rehabilitation education service has proved to be needed and effective in the broad area of care for the chronically ill, disabled, and aged; but beyond this we believe that it demonstrates three important facts.

1. Public assistance agencies can be concerned with more than buying the best service at the lowest price. They can legitimately be concerned with improving existing services, offering new ones, and stimulating the development of those services which their clients need.

2. Whether this kind of service on the State or local level is offered by public health, public assistance, or vocational rehabilitation agencies, no one agency really offers the service. Only the combined, coordinated efforts of all make any such service in rehabilitation effective and worthwhile.

3. In a general way, such projects as this can do much to bring better understanding to the possible conflict between improved standards of care and reasonably low rates of care, particularly for the medically indigent.

With only 2½ years of experience in the project we are far from the answers to many questions. We may not even know some of the questions. But there is ample accumulating evidence that such a program can be effective and helpful to people.

We know that it calls for each agency concerned to inventory frankly its present services and its philosophy of program goals. Active participation in such programs enhances not only our skills but also our appreciation of how each agency is professionally and morally involved in comprehensive rehabilitation.

Table 2. Selected characteristics of nursing homes as related to representation at the educational meetings

Nursing home classification	Number of homes represented	Total beds	Average number of beds	Percent of meetings at which represented	Percent represented in at least one meeting
Proprietary.....	47	1, 672	35. 6	51. 8	91
Domiciliary.....	4	53	13. 3	61. 8	100
Practical.....	33	1, 063	32. 2	51. 5	93
Professional.....	10	556	55. 6	48. 8	80
Nonproprietary.....	9	742	82. 4	17. 2	75
Domiciliary.....	2	234	117. 0	8. 8	50
Practical.....	3	256	85. 3	35. 5	100
Professional.....	4	252	63. 0	7. 4	75

ance of formal training activities. In addition, special emphasis was given to investigation of the relationship between the type of home and acceptance of lecture-and-discussion-type training. Interviews were conducted by experienced interviewers, and data obtained were verified when possible by official health department records.

Table 2 provides information regarding selected characteristics of nursing homes together with information regarding attendance at the series of meetings and demonstrates the marked relationship of attendance to ownership and to size of home. Attendance data were also appraised by age and sex of the administrator but no major relationships were seen.

Administrators who attended least often were those from the largest institutions and from the institutions of charitable or church sponsorship. All but two administrators of the nonproprietary institutions attended at least one meeting

but thereafter came to only 2.9 meetings, whereas administrators of proprietary institutions, on the average, attended 7.5 meetings.

Table 3 provides a review of the education and previous work experience of administrators using the same nursing home categories as table 2. As expected, administrators of the larger and the nonproprietary institutions tended to have more educational background and were more likely to have had training in one of the professions related to medicine. These data show that the St. Louis County program, on the average, was best received by the administrator with the least education and whose previous work experience was not likely to have been in one of the professions related to medicine.

The educational data are pertinent also in considering programs to raise nursing home standards. Only approximately half of the nursing home operators have completed high school. Professional personnel in public health

Table 3. Education and previous experience of nursing home administrators

Type of operation	Number of administrators	Number with work experience in—			Percent with medical experience	Education	
		Medical and health fields	Nursing homes	Nonrelated fields		Mean years of school completed	Range in years
Proprietary.....	64	13	21	30	20. 3	12. 4	8-21
Domiciliary.....	4	0	1	3	0	10. 5	8-13
Practical.....	41	6	17	18	14. 6	11. 9	8-21
Professional.....	19	7	3	9	36. 8	13. 7	10-18
Nonproprietary.....	9	4	0	5	44. 4	15. 4	12-21
Domiciliary.....	2	0	0	2	0	14. 0	12-16
Practical.....	3	2	0	1	67. 0	14. 0	12-16
Professional.....	4	2	0	2	50. 0	18. 3	15-21
Total.....	73	17	21	35	23. 3	12. 8	8-21

The educational material at the meetings was presented by members of the health department or other qualified persons, such as the county fire marshal and the director of welfare. The lecture presentation was followed by a period of discussion from the floor.

Attendance at the meetings was voluntary but was encouraged by the health department, and by the nursing home members of the policy committee through telephone calls and announcements at nursing home association meetings. The audience was somewhat reserved initially, but as the meetings progressed there was more open discussion. In the beginning there was very little interaction between the administrators, but, after a few meetings, a friendly relaxed attitude developed. Frequently, informal discussions continued after the 2-hour program was completed.

Table 1 presents a summary review of the topics discussed at the meetings and the number of administrators attending. Of the total number of 73 administrators representing 56 homes, all but 12 attended at least one session. Two of the three sessions with more than 50 percent of administrators attending followed immediately after the disastrous nursing home fire in Warrenton, Mo., in February 1957.

Some tendency for attendance to drop can be seen, and, for this and other reasons, it seemed desirable to undertake a critical review of the program. All administrators, without reference to their attendance at the sessions, were in-

Definitions

The following definitions of the categories of domiciliary, practical nurse, and professional nurse homes have been established by Missouri State legislation. These categories correspond generally with those of residential, personal care, and nursing care as defined for use in the 1958 National Conference on Nursing Homes and Homes for the Aged. Domiciliary homes are essentially for care of residents with little or no infirmity. The practical nurse category may accept residents requiring considerable medical and nursing supervision. The professional nurse category may accept residents requiring considerable medical and nursing supervision.

The "administrator" in this discussion is a person with principal administrative responsibility in the institution, usually as owner or co-owner but in some instances as a full-time, salaried executive. For nonproprietary institutions, which tend to have a more complex structure of administration, the definition of administrator is less clearcut.

interviewed with a questionnaire approved by the training committee to obtain their opinions regarding the training program.

A major purpose of the questionnaire was to review the educational background and experience of the administrators to determine if any relation existed between education and accept-

Table 1. Attendance of the nursing home administrators and topics of the meetings of the St. Louis County Nursing Home Institute

Date of meeting	General topic	Number administrators in attendance	Percent in attendance	Date of meeting	General topic	Number administrators in attendance	Percent in attendance
6/56-----	Introduction-----	28	37.8	5/57-----	Nursing-----	31	41.9
7/56-----	Sanitation-----	36	48.6	6/57-----	Medical care and bookkeeping.	22	29.7
8/56-----	Sanitation-----	32	43.2	9/57-----	Nursing-----	38	51.4
9/56-----	Sanitation and nutrition.	28	37.8	10/57-----	Personnel management and nursing.	26	35.1
10/56-----	Sanitation and nutrition.	30	40.5	11/57-----	Bookkeeping and legal matters.	26	35.1
11/56-----	Sanitation and fire safety.	22	29.7	12/57-----	Rehabilitation and social service.	28	37.8
12/56-----	Nutrition-----	29	39.2	1'58-----	Public assistance and recreation.	21	28.4
1/57-----	Proposed legislation.	28	37.8				
3/57-----	Legislation-----	41	55.4				
4/57-----	Fire safety-----	40	54.1				

depend most on personality characteristics of the individual administrator, and that if educational background influenced attendance at all, the highest attendance would be found in the group with the most education. It was further expected that programs could be developed to promote a free interchange of experience and opinion of the type seen in professional round-table discussions so that all administrators would share their knowledge and skills. In retrospect, however, it is obvious that it would be an unusual program which would be profitable for the administrator of a 10-bed domiciliary home and would be appropriate as well for the administrator of a 150-bed facility similar in most respects to a hospital. The dilemma also lies in preparing a course appropriate for persons with less than high school education and for those with formal professional training beyond college.

Furthermore, consideration must be given not only to education and professional training of the trainee but also to the selection of the most appropriate setting, class size, and educational technique. The type of program reported here is desirable in providing factual information to large groups regarding such matters as interpretation of fire regulations and basic nutrition topics for which a straightforward factual account of the usual lecture form are possible. In this context it should also be recognized that the members of the official inspection team also do or should conduct an educational program. The type of training activity reported by Hackley is an example of still another educational technique. It is one which may be particularly well suited to development of rehabilitation services. (See pp. 989-994.)

From many points of view the series of 17 meetings may be considered a success. Certainly, response for a series of voluntary meetings of 40 percent of the total potential audience is exceptionally high. A fortunate aspect of the program was its location within a single county. However, the report of the Saginaw County program indicates that administrators are willing to come from considerable distances and at considerable inconvenience for educational activities developed to improve nursing home facilities and services.

From another point of view the program was

successful in that attendance was highest among those with least education and least professional experience. It would appear then that the group in greatest need was most affected. This nursing home training program is in contrast to other public education activities in which it is more usual for response to be best among the better educated in the community.

The sessions also contributed directly to a better recognition by administrators of problems common to all nursing homes and thus contributed to an increased awareness of their professional responsibilities. This, we believe, is especially important for those in proprietary nursing homes, some of whom still have a tendency to conceive of the home primarily as a commercial venture. Whatever the commercial aspects of nursing home operation, recognition by the administrators that nursing homes provide residents and the community an essential service meriting the highest professional standards may well be a prerequisite for development of the most desirable standards of patient care.

Summary

The health department of St. Louis County, Mo., conducted a training program for personnel of nursing homes as a means of improving patient care in these institutions. Fifty-six nursing homes participated in a series of 17 educational meetings, which were planned by a policy committee made up of nursing home representatives, and held once a month during the period, June 1956 through January 1958. The response in attendance was 40 percent of the total potential audience.

Questionnaires submitted to participants revealed that only about half of the administrators had completed high school. Their level of education, however, was above that of the general population in the State and the county. The program was best received by those with the least education who were not likely to have had experience in professions related to medicine.

Analysis of the project indicated that to achieve the best participation and support the program planners should take into account the education and experience of the trainees as well as their needs. The types of institution repre-

responsible for the development of training programs may well consider that a high school education is hardly adequate educational background for operation of nursing homes. It must be recognized, however, that as a group, nursing home administrators are much better educated than the general population. In 1950 the median number of school years completed by persons 25 years and older in Missouri was 8.0. For St. Louis County for the same age group, the median school years completed was 10.3, and it is noteworthy that St. Louis County was among the 5 highest of the 114 counties in the State. The educational background data reported here are consistent with that reported by Lewis (1) who gives 10.7 as the median number of school years completed for the nursing home personnel attending the Saginaw County program.

Certainly these data regarding educational background clearly confirm the need for development of training programs to improve the knowledge and skills of these groups of administrators. It is further worthy of emphasis that a perfect attendance record at the St. Louis County program would have provided 34 hours of education in 18 months. But even a perfect record could only be expected to provide a very small part of the educational training which would be appropriate.

Table 4 reviews the administrators' evaluation of the program. Information regarding the program was obtained from all administrators without regard to their attendance record. As expected, administrators attending few sessions believed there was less benefit than those who attended many.

In so reporting, it may well be that the administrator is reporting accurately. The data presented indicate clearly that the largest institutions operated by the best trained personnel participated least, and this may well be the result of the lack of appropriateness of the training sessions for this group of administrators. It is probable that the committee planning the program was more representative of the typical proprietary institution and their recommendations may have led to a program best suited to this group of nursing homes.

Evidence that those who attended least often were not antagonistic to training activities is shown by the fact that more than two-thirds believed such courses were desirable and were willing to allow employees time off with pay to attend them. The large majority were in favor of developing training activities for specific personnel such as practical nurses and cooks. There is then little doubt that administrators are favorably disposed to training.

Information was also sought as to the administrators' opinion on sponsorship of training. All but 8 of the 56 homes recommended health department sponsorship or health department co-sponsorship with the State health department or nursing home association.

Discussion

The major interest of the material presented is, we believe, in the demonstration of the need for the differentiation of program to meet the differing backgrounds and needs of trainees. When the program was first planned it was expected that the acceptance of training would

Table 4. Administrators' evaluation and recommendations regarding training

Number of sessions attended	Number of administrators	Benefited from meetings			Training course for specific personnel		Will allow employees time off		
		Yes	No or no comment	Percent benefited	Yes	No or no comment	Yes	No or no comment	Percent favorable
0-4.....	22	12	10	54.5	16	6	18	4	81.8
5-11.....	19	16	3	84.2	12	7	15	4	78.9
12-17.....	15	11	4	73.3	14	1	13	2	86.7
Total.....	56	39	17	69.6	42	14	46	10	82.1

depend most on personality characteristics of the individual administrator, and that if educational background influenced attendance at all, the highest attendance would be found in the group with the most education. It was further expected that programs could be developed to promote a free interchange of experience and opinion of the type seen in professional roundtable discussions so that all administrators would share their knowledge and skills. In retrospect, however, it is obvious that it would be an unusual program which would be profitable for the administrator of a 10-bed domiciliary home and would be appropriate as well for the administrator of a 150-bed facility similar in most respects to a hospital. The dilemma also lies in preparing a course appropriate for persons with less than high school education and for those with formal professional training beyond college.

Furthermore, consideration must be given not only to education and professional training of the trainee but also to the selection of the most appropriate setting, class size, and educational technique. The type of program reported here is desirable in providing factual information to large groups regarding such matters as interpretation of fire regulations and basic nutrition topics for which a straightforward factual account of the usual lecture form are possible. In this context it should also be recognized that the members of the official inspection team also do or should conduct an educational program. The type of training activity reported by Hackley is an example of still another educational technique. It is one which may be particularly well suited to development of rehabilitation services. (See pp. 989-994.)

From many points of view the series of 17 meetings may be considered a success. Certainly, response for a series of voluntary meetings of 40 percent of the total potential audience is exceptionally high. A fortunate aspect of the program was its location within a single county. However, the report of the Saginaw County program indicates that administrators are willing to come from considerable distances and at considerable inconvenience for educational activities developed to improve nursing home facilities and services.

From another point of view the program was

successful in that attendance was highest among those with least education and least professional experience. It would appear then that the group in greatest need was most affected. This nursing home training program is in contrast to other public education activities in which it is more usual for response to be best among the better educated in the community.

The sessions also contributed directly to a better recognition by administrators of problems common to all nursing homes and thus contributed to an increased awareness of their professional responsibilities. This, we believe, is especially important for those in proprietary nursing homes, some of whom still have a tendency to conceive of the home primarily as a commercial venture. Whatever the commercial aspects of nursing home operation, recognition by the administrators that nursing homes provide residents and the community an essential service meriting the highest professional standards may well be a prerequisite for development of the most desirable standards of patient care.

Summary

The health department of St. Louis County, Mo., conducted a training program for personnel of nursing homes as a means of improving patient care in these institutions. Fifty-six nursing homes participated in a series of 17 educational meetings, which were planned by a policy committee made up of nursing home representatives, and held once a month during the period, June 1956 through January 1958. The response in attendance was 40 percent of the total potential audience.

Questionnaires submitted to participants revealed that only about half of the administrators had completed high school. Their level of education, however, was above that of the general population in the State and the county. The program was best received by those with the least education who were not likely to have had experience in professions related to medicine.

Analysis of the project indicated that to achieve the best participation and support the program planners should take into account the education and experience of the trainees as well as their needs. The types of institution repre-

sented and the kind of patients they serve should also be considered in planning the program.

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Reports on Radioactivity Levels

During the first half of 1959, the levels of strontium-90 in the Nation's major water courses, sampled weekly at 51 stations, were substantially below the levels set by the National Committee on Radiation Protection and Measurements as permissible for lifetime exposure of the general population.

The data are part of the information gathered on stream pollution by the national water quality network operated by the Public Health Service. This network includes 17 major rivers. Eventually, the study may provide precise measurements of the major forms of water pollution, including plankton, and the general chemical, physical, and bacteriological characteristics of the main rivers and streams.

The present network, operated in cooperation with State and local governments, universities, and industry, is expected to expand to 75 stations in the coming year and eventually to 250.

Reports on the levels of radioactivity in milk collected during July 1959 from 11 sampling stations across the country show that both the monthly levels and longer-term averages

for all radionuclides analyzed in samples from all stations remained below the levels which the national committee considers permissible for lifetime exposure of the general population.

The levels of radioactivity continued to fluctuate. The strontium-90 count decreased in July at all but 2 of the 11 stations. The Fargo, N.D.-Moorehead, Minn., area station showed a strontium-90 content of 22.1 micro-microcuries per liter, as compared with 20.6 micromicrocuries per liter in June. In the St. Louis area the strontium count was 17.6 micro-microcuries as compared with 11.2 micro-microcuries per liter in June and 34.6 micro-microcuries in May.

Milk was selected for study for specific nuclides in food because it is the most practical sample and is produced throughout the year in all sections of the country.

Both the network for measuring water quality and that for milk sampling are part of the Service's broad program for the measurement of radioactivity in air, water, and food.

STATUS

of

Tuberculosis

CONFERENCE REPORT

The present status of tuberculosis, responsible for 100 million days of illness annually in the United States, was discussed at the 1959 meetings of the National Tuberculosis Association, the American Trudeau Society, and the National Conference of Tuberculosis Workers. Approximately 3,000 physicians, scientists, public health officials, nurses, and executives and volunteers of State and local tuberculosis associations attended the May 24-29 meetings in Chicago.

Airborne Transmission

Airborne droplet nuclei were the source of infection for 71 guinea pigs breathing air exhausted from a tuberculosis ward, and 21 of these infections were traced to specific patients, reported researchers in a cooperative study by the Johns Hopkins University School of Hygiene and Public Health, the Veterans Administration, and the Maryland Tuberculosis Association.

At the VA Hospital in Baltimore, Md., a colony of approximately 160 guinea pigs breathed air exhausted from a 6-bed ward over the 24-month study period. When bacilli from 22 infected animals, cultured for drug susceptibilities, were compared with cultures of bacilli from the patients' sputums, it was apparent that two patients had produced 19 of the 22 infections. The one drug-susceptible organism probably came from a patient receiving initial treatment.

The researchers suggested that highly positive sputum and absence of effective therapy are important in determining a patient's infectivity as well as a natural mechanism for atomizing the infectious material and the continued viability and infectivity of the organism after becoming airborne. They felt that the study not only strengthened the case for airborne transmission but indicated an experimental tool for the study of the infectivity of human tuberculosis.

The investigators were Dr. R. L. Riley, C. C.

Mills, Dr. W. Nyka, N. Weinstock, Dr. P. B. Storey, Dr. L. U. Sultan, Dr. M. C. Riley, and W. F. Wells, of the Johns Hopkins University School of Hygiene and Public Health and the Veterans Administration Hospital, Baltimore.

Disinfecting the upper air of rooms with ultraviolet light appeared to block transmission of the influenza virus, according to Dr. Ross L. McLean, now at Emory University School of Medicine, Atlanta, Ga.

At the Veterans Administration Hospital in Livermore, Calif., one unit with complete facilities for the care of patients was irradiated. Serologic samples were obtained from all hospital patients and personnel in July 1957, November 1957, and March 1958. Practically none of the patients or personnel had been vaccinated against influenza. Staff members were exposed to the respiratory infections prevalent in the community.

Between July 28, 1957, and March 15, 1958, only 4 (2 percent) of 209 patients in irradiated rooms were infected; 75 (19 percent) of 396 patients in nonirradiated rooms were infected; and 92 (18 percent) of 511 hospital personnel were infected.

The differences in the prevalence of infection, as determined serologically, strongly suggest that an important mechanism of transmission of epidemic influenza was significantly blocked, McLean stated.

Since the ultraviolet radiation was designed to disinfect chiefly the truly airborne particles, these findings suggest that an airborne mechanism is the principal mode of transmission of epidemic influenza.

Race and Environment

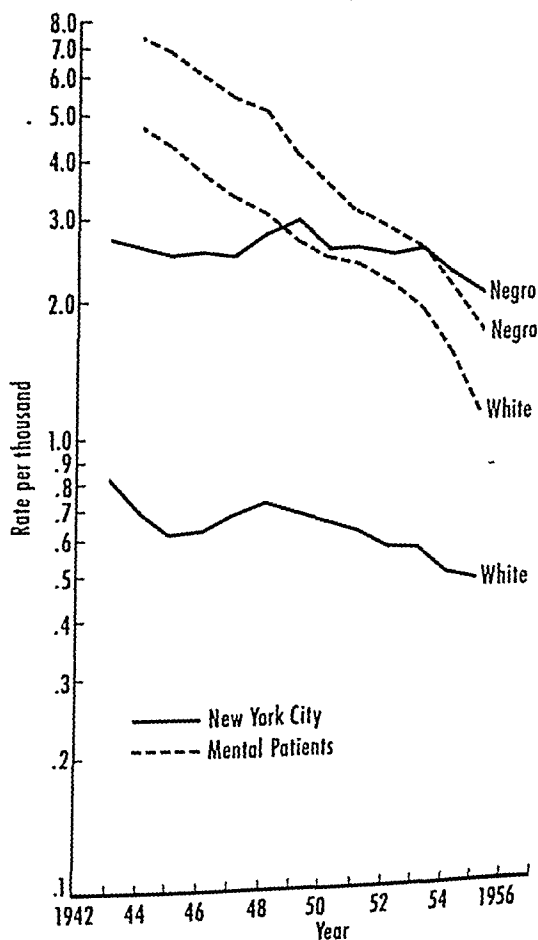
In a similar environment the response to tuberculosis of the Negro and white is similar, and racial factors probably play a minor role in producing differences in tuberculosis morbidity and mortality, concluded Dr. Julius Katz and Solomon Kunofsky, division of tuberculosis control, New York State Department of Health, Albany.

They studied white and Negro patients in hospitals of the New York State Department of Mental Hygiene, where living conditions are identical for both races. Between 1942 and

1955, the incidence of tuberculosis among the Negro patients exceeded the rate among the whites by about 50 percent. In New York City during the same period, the rate of development of tuberculosis was four times as high among Negroes as among whites (see chart). The incidence decreased at approximately the same rate for the mental patients of both groups, so that by 1955 the age-adjusted rate among Negroes was only 8 percent higher than among whites.

Even before the development of antimicrobial therapy not only was the differential between the groups reduced by similar environmental conditions but the Negroes' survival was about equal to the whites'.

Tuberculosis case-reporting rates in New York City and tuberculosis incidence rates in New York State mental hospitals by race, 1942-56



Dr. W. A. Paddon, of the Grenfell Mission Hospital, North West River, Labrador, Canada, found no special susceptibility to tuberculosis among the Labrador Eskimos and Indians.

He attributed their high tuberculosis death rate to inadequate control measures and environmental factors such as overcrowded homes, poverty, poor hygiene, and malnutrition. He described how epidemics of other diseases propagate tuberculosis and said that the effect of exposure of a community to any infectious disease will be determined by its past experience with the disease and not by the racial composition of its population.

In northern Labrador the tuberculosis death rate was cut from 300 to 30 per 100,000 from 1947 to 1956, and the percentage of X-ray films showing active or probably active lesions dropped from 20 to less than 4 percent. People originally reluctant to undergo treatment were won over once they were shown that tuberculosis could be arrested. Those spreading the disease, or likely to do so, were identified through yearly surveys done during visits by a small hospital ship with portable X-ray equipment and on followup visits by dogsled.

Hospitalization, drugs, surgery, and programs of rehabilitation and information were the major methods of control. With modern aircraft and radio communication now available, patients can be evacuated quickly to improved hospital facilities. BCG vaccination is being tried, but Paddon noted that as a result, the tuberculin test will lose its considerable diagnostic value as well as its value in studying tuberculosis in a community.

Legal Detention

How patients detained under court order are cared for in the security division of the Ohio Tuberculosis Hospital was described by Dr. Robert H. Browning, director of the hospital, and Dr. Irving Pine, Columbus Psychiatric Institute and Hospital.

Although the Columbus hospital serves a population of 6.3 million, the 17-bed division is adequate because the existence of a detention facility has prompted patients to accept care voluntarily in their home counties. Also there is a high rate of transfers from the detention

division to open wards, and some counties refuse to use the security division.

The hospital's policy is to provide recalcitrant patients with treatment and permit them activities as similar as possible to those of other patients, the authors said. The staff is urged to adopt a calm, firm approach rather than a punitive one. Differences in privileges for those in the security division include the denial of money and street clothes, censorship of mail and packages for contraband, restricted visiting hours, and being locked in their rooms at night and during rest hours. Two employees are always on duty when the patients are not locked in.

Patients who are beyond persuasion or who continue to be abusive or threatening are left alone for 24 or 48 hours in a security room with limited equipment, and often become cooperative, according to Browning and Pine. Patients are transferred to open wards when they show understanding of their situation and behave reasonably well. A committee whose members include several disciplines meets weekly to decide on transfers and other matters.

Analysis of the 50 patients cared for by the division in its 18-month existence indicates that most of them, while generally becoming more cooperative, do not behave normally. They remain dissatisfied and have varying amounts of subsurface tension.

The psychiatric resident and the consultant psychiatrist of the hospital classified the patients not only to identify various syndromes and disorders but also to study the relation of recalcitrant status to psychiatric appraisal.

The largest group of patients, 16, were alcoholics, and 7 were in an acute alcoholic episode at the time of admission. All had a personality disorder in addition to alcoholism. Many became almost model patients because the hospital filled their dependency needs.

Twelve eluded strict psychiatric classification and were described as marginal personalities. They had borderline or low intelligence quotients, seemed inadequate and immature, and had made marginal social adjustments in their jobs and families. It seemed likely they resisted hospitalization because they felt they could not adjust in the hospital.

Seven had personality disorders. Their re-

sistance to the hospital seemed to be based on a conflict produced by the family or the social milieu so that they had to refuse the need for hospitalization or risk being uprooted from a tenuous position.

The remaining patients fell into these categories: organic brain syndrome, 2; psychosis with organic brain syndrome, 2; chronic paranoid schizophrenia, 3; mentally deficient, 1; and miscellaneous unclassifiable personal problems, 7.

Casefinding

Active primary tuberculosis was found in 158 children whose disease would have been missed without the thorough checking of the family contact investigation service of the Houston Children's Tuberculosis Clinic, stated Dr. Katharine H. K. Hsu, Baylor University College of Medicine, Houston, Tex. The 158 children included 29 with positive cultures for *Mycobacterium tuberculosis*, 66 with X-ray evidence of tuberculosis, 32 whose tuberculin reactions were converted to positive within 1 to 5 months, and 31 (under 36 months of age) with infections considered active because of a positive tuberculin reaction. None showed any signs of ill health which would have prompted parents to seek medical examinations for these children.

These cases were found in 1957-58 on examination of 825 children contacts of 129 family groups. Contact investigation began when a child in the family was diagnosed as having active primary tuberculosis. The immediate family as well as close contact families were examined. Adults were screened with 70-mm. microfilms. Among 582 adults screened, 26 cases of active pulmonary tuberculosis were found. Children were tuberculin tested. All positive tuberculin reactors were given thorough clinical and bacteriological examinations. Negative reactors were given periodic tests to detect conversion of tuberculin reaction.

Intensifying contact investigation and giving proper attention to childhood tuberculosis will enhance greatly tuberculosis control, Dr. Hsu said. This can be done successfully with an organized effort of local health agencies and proper education of patients' families.

The family contact investigation service which operates in cooperation with existing public health facilities in Houston and Harris County, was established with grants from national, State, and local tuberculosis associations. Its annual operating expenses amount to \$8,650.

If tuberculin tests are substituted for X-rays of pregnant patients, significant nontuberculous disease in nonreactors may be missed, affirmed Dr. Dorothea D. Glass, Woman's Medical College of Pennsylvania, Philadelphia. To determine whether the tuberculin tests were an adequate replacement for photofluorograms, both diagnostic aids were employed with obstetrical patients at two Philadelphia hospitals.

In a 6-month period at Woman's College Hospital, no significant lesions were found among tuberculin reactors or nonreactors, although 20 percent of the 308 women participating reacted to first strength PPD and 13 percent to both first and intermediate strength doses. One patient failed to report for her X-ray, and 13 percent failed to complete tuberculin tests.

The absence of lesions in this group was attributed to the relatively high socioeconomic level of the clinic patients. Therefore, the study was extended to 630 patients of Blockley Division of Philadelphia General Hospital. They were primarily women on public assistance, among whom, it was felt, would be a higher percentage of tuberculin reactors and some clinical tuberculosis. The age and race composition of both hospital populations was similar; 90 percent were Negroes between 15 and 35 years of age.

These women were tested on admission, most often immediately postpartum. Of the 432 women whose tests were read, 23 percent reacted to first-strength PPD. Thirty-one percent were discharged before the test could be read; the average hospital stay is 2 or 3 days, despite the hospital policy of a 5-day postpartum stay. Only one patient at Woman's College Hospital did not have an X-ray taken; 19 percent of the Blockley patients had no chest X-rays during their hospital stay.

X-ray findings were significant for two asymptomatic nonreactors; one had sarcoidosis, the other a congenital heart lesion. No previously unsuspected active tuberculosis was found.

Before relinquishing the gains available through routine X-rays of pregnant women, consideration should be given to the probability that the return rate for reading tuberculin tests may be as low as 50 percent, and significant previously unsuspected nontuberculous disease may be missed if only reactors receive X-rays, maintained Dr. Glass.

Co-authors were Dr. Fruma W. Ginsburgh, Dr. Katharine R. Boucot, Marie Capitanio, and Leonora Gray, Woman's Medical College of Pennsylvania, and Bernard Broad, Temple University School of Medicine, Philadelphia.

BCG Vaccination

A 20-year study showed a statistically significant difference in the number of cases of tuberculosis among infants who received BCG vaccinations and control subjects, reported Dr. Sol R. Rosenthal, director, tuberculosis prevention research, Chicago Municipal Tuberculosis Sanitarium; medical director, Research Foundation, Cook County Hospital; and director of the Institution for Tuberculosis Research, University of Illinois, Chicago.

Among the 1,665 control subjects there were 57 cases; among the 1,716 infants vaccinated, 16 cases ($\chi^2=24.62$; $P=<0.001$). The study included 3,381 infants born at Cook County Hospital, Chicago, from 1937 to 1948. All were from nontuberculous households in areas with high tuberculosis incidence.

The followup items, continued until 1957, included birth weight, sex, race, area of birth, extent of contact with tuberculosis, examinations in the clinic, X-rays, tuberculin tests, and tuberculin conversion rates. A total of 80 items were card cataloged, tabulated, and submitted for statistical analysis.

The overall comparability of the vaccinated and the control subjects appears adequate in most respects, and statistically significant differences have been identified for consideration and assessment for medical importance, stated the statistical analyst, Dr. H. C. Batson, professor of biostatistics, public health department, University of Illinois.

Other co-authors were Dr. Erhard Loewinson, Dr. Mary L. Graham, and Margaret G. Thorne of Chicago Municipal Tuberculosis

Sanitarium, and Dorothy Liveright and Violet Johnson, Institution for Tuberculosis Research, University of Illinois, Chicago.

Reinfection

Age, sex, and lack of exposure to a fresh source were factors indicating an endogenous origin for reinfection in a study of 113 patients with chronic pulmonary tuberculosis by Bellevue Medical Center researchers. The patients, all with previous primary infections diagnosed during the pediatric age range, were seen at the chest clinic of the children's medical service of Bellevue between 1930 and 1956.

Risk of developing chronic pulmonary tuberculosis is greatest in adolescence and in children who had primary tuberculosis after 6 years of age. The rate for girls was higher than that for boys. Chronic pulmonary tuberculosis was first diagnosed within 2 years of menarche for 40 percent of the girls.

Histories of 71 patients indicated exposure to a case of tuberculosis at the time the primary infection was diagnosed; only 7 histories indicated renewed exposure when the chronic pulmonary disease was diagnosed. In the majority of cases, no anatomic relationship between the site of the primary and the chronic pulmonary tuberculosis could be established. The chronic disease was discovered through routine X-ray of two-thirds of the patients.

Following is the present status of the 113 patients:

	Male	Female
Followed to 25 years of age.....	20	34
Followed to 21-24 years of age.....	6	6
Still under 21 years of age.....	2	6
Tuberculosis deaths.....	8	24
Nontuberculosis deaths.....	1	1
Lost to followup.....	0	5
Total	37	76

The death rate from chronic pulmonary tuberculosis was 21.6 percent for the boys and 31.6 percent for the girls. Of the 32 deaths, 22 occurred in patients who were first diagnosed with minimal disease. None received specific therapy during the primary phase. Only 20 patients received antimicrobial therapy for chronic pulmonary tuberculosis, and in only

three instances was treatment given within a year after the diagnosis was established.

The findings indicate the importance of keeping children with primary tuberculosis under long-term observation to gain information about the pattern of later development of chronic pulmonary tuberculosis, stated investigators Dr. Edith M. Lincoln, adjunct professor of pediatrics; Dr. Lilian A. Gilbert, associate clinical professor of pediatrics; and Dr. Soledad M. Morales, instructor in pediatrics. All are with the New York University, Bellevue Medical Center, New York City.

No relapses after 5 years occurred among 83 percent of 669 patients with negative sputums at least 6 months prior to discharge, reported Dr. Thomas F. Sheehy, medical director, Firland Sanatorium, Seattle, Wash. Relapses occurred in 11.2 percent of the original sample, 9.6 percent in the first year. There were 42 deaths from nontuberculous causes and 3 deaths from tuberculosis in patients whose disease had relapsed.

The only criteria for selection were sputum negativity for 6 months and live discharge. Status was determined as of December 31 of each year. Relapse was defined as the occurrence of positive bacteriology on a single or repeated occasion either by smear, culture, or X-ray worsening not explainable by some other acute identifiable cause.

Sheehy found that relapse occurs more commonly in middle-aged males with far advanced, cavitary disease with a secondary diagnosis of alcoholism who leave the hospital against advice. It is least common among young females with noncavitary disease who have undergone resection. Apparently, longer periods of chemotherapy prior to discharge and prior to final determination of status exert a favorable prognostic outlook.

New Techniques

Promising new techniques, a diagnostic blood test for tuberculosis and two rapid, simple methods of detecting viable tubercle bacilli in sputum, were described by several investigators.

Dr. Robert C. Parlett and Dr. Guy P. Youmans, Northwestern University School of Med-

icine, developed a serum gel diffusion test. An agar suspension of tubercle antigen at the bottom of the test tube with a covering layer of pure agar receives the patient's serum. Acid-fast antibodies diffuse toward the center of the tube, forming a precipitation ring when fixed by the test antigen.

In serums from 465 nontuberculous persons, 97.9 percent possessed no antibody to mycobacterial antigens by this test, and only 2.1 percent of the reactions were false positives. Gel diffusion tests were positive in 84.2 percent of serum specimens from 380 patients with far advanced active pulmonary tuberculosis, in 73.5 percent of 245 patients with moderately advanced active pulmonary tuberculosis, and in 57.8 percent of 128 patients with minimally active disease. The department of microbiology of the medical school and 20 hospitals and sanatoriums cooperated in extensive double blind field trials to determine the sensitivity, reliability, and limitations of the diagnostic test.

Reporting on the use of the test at the Suburban Cook County Tuberculosis Hospital-Sanitarium, Hinsdale, Ill., Dr. William Lester stated that serums from 188 of 193 patients with bacteriologically confirmed disease were positive. He also said that all test results were positive in specimens from 28 patients with photochromogenic infections and in 78 percent of the specimens from patients with scotochromogenic cultures.

A mouse test to detect tubercle bacilli in sputum and gastric lavage specimens failed only once in 362 clinical trials and is much faster and more sensitive than conventional procedures, according to Dr. David Gale, Elizabeth A. Lockhart, and Alexander Jack, Veterans Administration Hospital, Albuquerque, N. Mex.

In the test they devised, a portion of the concentrate from the specimens was injected intraperitoneally into four mice, together with hog gastric mucin. The animals were sacrificed at 5, 10, 15, and 20 days; gross pathological changes were noted; and impression smears of splenic tissue were studied microscopically for acidfast bacilli, with each slide taking 10 minutes.

The study group consisted of 188 tuberculous patients in various stages of the disease, 55 pa-

tients admitted to medical wards, and 119 outpatients. Specimens from 74 patients were positive by both mouse test and by culture. All these patients were positive by mouse test in 15 days, compared with 52 days required by the conventional technique; 97 percent were positive in 10 days, and 85 percent in 5 days.

The mouse test also detected acidfast organisms in specimens from 64 patients whose cultures were negative. Half of these patients had positive cultures at some time during the previous year.

A new 5-day slide culture technique tested on 100 sputum samples had a 98-percent success rate compared with a rate of 69 percent when the conventional method was used, reported a team of Massachusetts investigators. For the test the researchers developed a new mucolytic and proteolytic enzyme which liquefies sputum more efficiently and is less toxic to acidfast organisms. They eliminated centrifugation and collected the acidfast micro-organisms on glass coverslips treated with silicone, a substance to which the acidfast micro-organisms have an affinity. After a 5-day incubation period the coverslip samples are treated with a modified Hanks' differentiating acidfast stain, permitting superior microcolonial differentiation of acidfast micro-organisms even under low magnification. The developers of the test are James B. Gray, State Public Health Department Laboratory, Boston; Dr. Sanford Chodosh, Lung Station (Tufts), Boston City Hospital; and Edith Reinisch, Westfield State Sanatorium, Westfield, Mass.

Other Lung Diseases

Despite thorough safety precautions, laboratory personnel working with the causative agents of psittacosis and Q fever sometimes become infected, stated a Johns Hopkins University School of Medicine researcher, Dr. Allan H. Levy.

He reported on 12 cases of psittacosis and 27 cases of Q fever which occurred sporadically in the microbiological laboratories at Fort Detrick, Md. Eleven of the twelve patients with psittacosis had worked directly with the virus, but only two had been aware of a laboratory accident.

The illnesses were somewhat milder than naturally acquired infections. Eight patients had an abrupt onset with malaise, headache, chills, and fever; four had an insidious onset. Cough was common but often did not develop until the second week of illness. Rales were heard early in the course of illness of three patients, but did not develop until the fourth or fifth day of hospitalization in six others. X-ray findings of pulmonary infiltration were noted in the lower or middle lobes of 10 patients and the upper lobes of 2. Nine patients were treated with one of the tetracyclines, chloramphenicol, or penicillin, and all responded promptly.

Only 18 of the 27 patients with Q fever worked directly with *Coxiella burnetii*, although several others were infected while in areas adjacent to laboratories. In four, the source of infection remained obscure. None of the illnesses was severe, and only 21 of the 27 required hospitalization.

Although most patients had been vaccinated with both Q fever and psittacosis vaccines, complement-fixing antibody titers after infection were higher and persisted longer than those resulting from immunization. It was not possible to determine if the large proportion of mild illnesses was the result of prior immunization or the mode of infection or the result of effective case detection through continual surveillance of a closed population.

Co-authors were Dr. Edward W. Hook and Dr. Robert R. Wagner, Johns Hopkins University School of Medicine.

Several attitudes toward the relationship between smoking and lung cancer prevail, stated Dr. Dean F. Davies, administrator for research on lung cancer, American Cancer Society, New York City. They can be categorized on five decision levels—intuition, clinical judgment, epidemiological evidence, pathogenetic evidence, and “proof positive.” The present status of knowledge falls short of definitive proof, but the evidence is sufficiently impressive to satisfy most observers.

Although the condensates derived from tobacco smoke and atmospheric pollutants produce cancer on skins of selected strains of animals, invasive epidermoid lung cancers have not been reported following exposure to typical samples of these agents. Changes in

three instances was treatment given within a year after the diagnosis was established.

The findings indicate the importance of keeping children with primary tuberculosis under long-term observation to gain information about the pattern of later development of chronic pulmonary tuberculosis, stated investigators Dr. Edith M. Lincoln, adjunct professor of pediatrics; Dr. Lillian A. Gilbert, associate clinical professor of pediatrics; and Dr. Soledad M. Morales, instructor in pediatrics. All are with the New York University, Bellevue Medical Center, New York City.

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Public Health Nursing Services to Patients

Fourth in a series of reports resulting from a study of public health nursing functions, this monograph describes the public health nursing care received by individual patients within diagnostic categories. Previous papers have dealt with the study design, with the subsequent public health nursing service provided in households as a result of the referral of the initial patient from that household, and with the extent of public health nursing services given on a family basis.

Basic data were taken from individual patient records submitted by two nurses in each of five health departments and three combination agencies over a 2-year period. Public health nursing service in each of these agencies was on a generalized basis.

The data include all the public health nursing services given to individual patients and the types of situations and problems related to the recovery or the improvement of the patient which were encountered during the provision of that service. The focus of the study was on the individual and his nursing care rather than on the nurse and her activities.

The diagnostic category of the patient is the primary classification used for the entire analysis. The term "patient-nurse contact" is used to describe all the public health nursing services given to or in behalf of the patient regardless of the place or the method, such as home or telephone.

Within this framework, areas of public health nursing services where little information has been available previously are identified and documented. One such area is what activities constitute public health nursing service; another is under what circumstances and for what reasons service is provided. Data on how and

where nursing services were given supply evidence that the usual reporting of nursing services to and in behalf of patients overlooks many effective services which nurses provide through telephone calls and letters. The numerical data on the patients who had two or more diagnoses give clues to the location of "hidden patients" for some diagnostic categories.

Types of Service Provided

That the amount and kind of nursing service received by patients are directly related to the type of disease or condition present was borne

Public Health Monograph No. 59

Public Health Nursing Service to Patients. By *Marion Ferguson*. Public Health Monograph No. 59 (PHS Pub. No. 685), 52 pages. U.S. Government Printing Office, Washington, D.C., 1959, price 40 cents.

The accompanying summary covers the principal contents of Public Health Monograph No. 59, published concurrently with this issue of Public Health Reports. The author is with Public Health Nursing Services, Division of General Health Services, Public Health Service.

For readers wishing the data in full, copies are on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Official agencies and others directly concerned may obtain single sample copies without charge from the Public Inquiries Branch, Office of Information, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

the epithelium of the tracheobronchial tree, including both inflammatory and proliferative reactions, following chronic exposure to cigarette smoke and simulated atmospheric pollutants have been observed.

Epidemiological data are inadequate to quantify the roles played by cigarette smoke and atmospheric pollution in the causation of lung cancer. For future research it would be desirable to continue efforts to produce epidermoid lung cancer experimentally in animals by these agents, he said. Either on human or

other animal populations it would then be desirable to study host factors, including genetic, immunological, and endocrinological influences, as well as history of previous disease, congenital conditions, and psychological factors.

The carcinogenicity of each fraction of tobacco smoke condensate should be tested for the lung as has been done for the skin. The identification of noncarcinogenic substances from both sources and a study of their contribution to proliferative changes in bronchial epithelium also require close attention.

Personnel Announcements

Dr. Morris Schaeffer, noted virologist, resigned from the Public Health Service June 30, 1959, to become director of the bureau of laboratories in the New York City Health Department. He has been chief of the Virus and Rickettsia Section, Laboratory Branch, Communicable Disease Center, Montgomery, Ala., since 1949.

Dr. Schaeffer, who has been active particularly in the fields of poliomyelitis and influenza, will also be on the staff of the New York City Public Health Research Institute and professor of medicine at the New York University-Bellevue Medical Center. Besides developing an outstanding scientific staff, he directed training courses in virology and rickettsiology which attracted large numbers of students from around the world.

Dr. Robert Dean Wright has been appointed to the new post of assistant director for medical and health activities of the Office of Vocational Rehabilitation. A commissioned officer of the Public Health Service since 1938, Dr. Wright was detailed from the position of deputy regional medical director and general

health services director at Charlottesville, Va., a post he occupied for 2½ years. At the same time he served as clinical professor of preventive medicine at the University of Virginia. Previously, he founded the University's department of preventive medicine and served 6 years as chairman of the department.

Another appointment in the Office of Vocational Rehabilitation brought Dr. Frank H. Krusen, founder and senior consultant of the Mayo Clinic's section of physical medicine, to the post of special assistant to the director for health and medical affairs. He is on leave from the Clinic.

Dr. Donald Roger Chadwick, a career medical officer of the Public Health Service, has been named secretary of the Federal Radiation Council, on detail from the position of chief of the Program Operations Branch, Division of Radiological Health, Public Health Service, which he has held since July 1, 1958. Before then, he was acting chief of the division for 4 months, having been liaison officer for radiation in the Office of the Surgeon General.

Epidemic Hemorrhagic Fever in Argentina

D. J. GREENWAY, H. R. RUGIERO, A. S. PARODI, M. FRIGERIO, E. RIVERO, J. M. de la BARRERA, F. GARZON, M. BOXACA, N. METTLER, L. B. de GUERRERO, and N. NOTA

A DISEASE of unknown etiology appeared a few years ago in the northwestern part of the Province of Buenos Aires. The clinical aspects were first described by Arribalzaga (1) and later by Duva (2), who suggested that it may be of leptospiral origin. The disease appeared again in 1958, and in May of that year we went to the city of Junín to study its clinical and etiological features. This study was the first to provide evidence of the virological nature of the causative agent (3). Later, Margni and co-workers, on the basis of little evidence, presented the opinion that poisoning by dieldrin, aldrin, or other products, might be an auxiliary factor (4).

At a special meeting held in the University of Buenos Aires on December 19, 1958, we presented a full report of our work with the disease, defining it as new in Argentina and giving additional evidence of its virus etiology (5,6). This work has since been confirmed by other investigators (7).

The clinical descriptions, which we had previously published, were recently confirmed by studies of the disease produced by inoculation of human volunteers. This research was conducted by two groups, working independently, and their reports appeared at about the same time (7,8).

Clinical Characteristics

Argentine epidemic hemorrhagic fever is an infectious disease, attacking principally male

rural laborers with a characteristic symptom complex—renal, nervous, cardiovascular, and hematic. The disease lasts from 10 to 15 days and may end in recovery without sequelae or in the patient's death (9,10).

The onset of the disease is usually gradual, the symptoms making their appearance insidiously. There is general discomfort, asthenia, cephalgia, myalgia, anorexia, saburral tongue, vomiting, alternations in movements, especially in gait, and sometimes slight strabismus. Some cases show palatal enanthema, but exanthema is not seen. The pulse is rapid or normal, the blood pressure tends to be low, and the fever may be moderate or high (40° C.).

Three to five days after onset the symptoms become accentuated. There is marked dehydration, exanthema, and discrete congestion involving the thorax and flanks which may later show petechiae. In some cases there is epistaxis, hematemesis, melena, hematuria, and gingival hemorrhages. The Rumpel-Leede phenomenon is usually positive.

Respiratory symptoms are rare and X-rays are negative. There may be a cough and moist stertorous breathing. The hypotension becomes quite marked, sometimes to the point of collapse.

Abdominal palpation reveals epigastric sensitivity and sometimes a slightly enlarged liver. In some cases there is icterus. Oliguria or anuria is sometimes seen. Nervous symptoms include cutaneous hyperesthesia, muscular spasms, and spasms of the glottis. The patient may become stuporous or delirious.

In cases with favorable evolution, the fever drops rapidly; there is progressive disappearance of the urinary symptoms; and the general condition gradually improves. The patient

The authors are in the department of microbiology and parasitology of the medical school of the University of Buenos Aires, except Dr. Rugiero, who is in the school's department of infectious diseases.

out by the data. Patients with long-term illnesses required more time for each visit of the nurse, needed a greater number of visits, and were served over a longer period than patients with conditions that traditionally have been considered health department responsibility. The secondary problems, such as emotional, economic, and social difficulties, with which the nurse had to deal also varied with the diagnostic category of the patient.

Comparable amounts of nursing service were given to patients in the health supervision, acute communicable disease, and venereal disease categories. Patients in the orthopedic and mental health categories received twice as much service, and those with chronic diseases from three to five times as much.

Teaching about personal and emotional hygiene, normal growth and development, nutrition, the need for medical supervision, and the prevention and control of communicable diseases was the nurses' primary responsibility in the traditional health department programs devoted to health supervision, maternity, acute communicable disease, and venereal disease. Instruction appropriate to the patient's condition for patients in the other diagnostic categories, however, was accompanied by a considerable amount of actual nursing care. For instance, patients with chronic illness, noncommunicable diseases, tuberculosis, or orthopedic conditions required the administration of medications, a variety of other treatments, and, often, general care. In the traditional programs mentioned, nursing care was rarely given on a continuing basis.

Recognition of emotional problems, handling of minor ones, and referral of the more serious ones to sources of adequate care were a regular part of the nurse's job. The types and frequency of occurrence of these problems did not seem to be influenced greatly by the patient's diagnostic category except for patients in the mental health group. Behavior of the patient, family tensions because of the illness, parent-child relationships, and reactions to the physical condition or the medical care needed were problem sources common to all groups.

The same sort of economic problems were consistently encountered in service to patients

in all diagnostic categories. Income inadequate to cover normal necessities, the cost of medical and institutional care and of transportation to that care, and unemployment were reported frequently. While housekeeping assistance of some kind was needed by some patients in all categories, the need was particularly acute for the patients with chronic illness.

The greatest variation among the categories was shown in reports of the types of social problems encountered. With the chronic disease patients, education or language difficulty, community reaction to the patient's condition, and the lack of occupational and recreational facilities were real handicaps. The social problems of unmarried and of deserted mothers complicated the provision of adequate care for them. Eligibility of the patient for medical and institutional care and the existence or absence of such facilities were factors in the adequacy of treatment available to the tuberculosis patients.

Conclusions

In the long-established health department programs, the nurse's job is primarily teaching, with a minimum of nursing care given. The newer programs require, in addition to the teaching, the actual giving of nursing care frequently, consistently, and over a long period of time. This has real implications for agencies which are considering their role in the care of the sick and the extent to which they may offer services.

The study data indicate ranges of volume and types of public health nursing services but are not intended to be used as standards, since local needs determine agency policies and programs which, in turn, influence service. The methods of this study can be applied by any agency to obtain similar data which will reflect its own operating experience. Since the nurse participants in this study used as sources of data the regular health department records of the eight agencies where they were employed, it is reasonable to assume that the same kind of information is available or can be obtained in any agency where public health nursing services are provided.

The first from blood; the second from a suspension of viscera: brain, liver, spleen, and kidney; and the third from urine containing large amounts of blood.

Tissue culture did not propagate viral growth. The hemagglutination test was negative at different pH adjustments using chicken red blood cells from day-old chicks and adults. The virus is inactivated at 56° C., for 30 minutes, and also by ether and by trypsin.

The relation of the isolated virus with the disease was demonstrated by rise in antibody titer (complement fixation and neutralization tests). This relation was also demonstrated by the inoculation of a human volunteer with infected material, thus reproducing the disease, with subsequent isolation of the virus from his blood in the acute stage of the disease. Sero-logic tests were confirmatory in this case.

Epidemiology

Most of the patients are rural laborers, employed in the corn (maize) harvest beginning in April and ending in July or August. Some patients have not been engaged in such activity, but have had some contact with the cornfields. The occupations of 73 patients seen by us during the 1958 epidemic are the following:

Occupation	Number
Corn harvester.....	37
Rural worker (general).....	11
Housewife (rural).....	5
Housewife (urban).....	1
Dairy-farm worker.....	5
Farm supervisor.....	3
Cattle driver.....	2
Rural mechanic.....	2
Tractor driver.....	2
Public road worker.....	1
Veterinarian.....	1
Eatonologist.....	1
Rat exterminator.....	1
Hobo (tramp).....	1
Total.....	73

The sex and age of the same group of patients are presented in the table. There is no evidence of interhuman transmission of the infection. The case-fatality rate in that group was 23.28 percent (9).

The field where the patients worked con-

tained large numbers of field mice (*Hesperomys laucha laucha*), which are heavily parasitized with blood-sucking mites. The nests of these rodents are also heavily infested with the mites. It is interesting to note, however,

Sex and age distribution of 73 patients with Argentine epidemic hemorrhagic fever, 1958

Age group (years)	Recovered cases		Fatal cases		Total
	Male	Female	Male	Female	
10-20.....	10	3	1	0	14
21-30.....	13	1	6	0	20
31-40.....	10	3	3	0	16
41-50.....	7	2	4	0	13
51-60.....	4	2	1	0	7
61-70.....	1	0	2	0	3
Total.....	45	11	17	0	73

that no unusual morbidity or mortality in either wild or domestic animals was observed in the district during the course of the epidemic. There is one report (14) of recovery of the virus from arthropods from the epidemic district, but this work awaits confirmation.

Subsequent to the submission of this paper for publication two others appeared with further information on the subject. In one, the authors announced the isolation of the virus from field rodents: several times from *Mus musculus*, once from *Hesperomys laucha*, and once from *Akodon arenicola*. Tests with *Oryzomys flavescens* and *Rattus* sp. were negative (Parodi and others, Prensa Med. Arg. 46: 555, 1959). In the other paper, the authors demonstrated the neutralization in vivo of the virus with the immune serum of Russian spring-summer encephalitis (Parodi and others, Rev. Soc. Arg. Biol. In press).

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commences to urinate abundantly but continues to eliminate a large amount of albumen.

In the very severe cases, the patients go into coma of the uremic or encephalopathic type, and die in collapse.

Laboratory Findings

According to findings in the laboratory, the blood picture is characterized by leukopenia, sometimes quite accentuated (400 leukocytes per milliliter), with preservation of normal percentages in the differential count except for the absence of eosinophiles (2,11). There is a marked reduction in platelets, which may reach 20,000 to 30,000 per milliliter. The red cell of the bone marrow reveals hypofunction during convalescence.

Blood chemical findings (glucose, creatinine, bilirubin) are generally normal. Liver function tests, thymol and Hanger, also give normal results. The urea usually increases to 0.60 and to 1.00 percent (urease test). Sodium and calcium levels are low within normal range. Total lipids, cholesterol, and esters decrease, especially in acute cases. Proteins keep within normal values, with slight hypoalbuminemia.

There is moderate albuminuria with marked quantities of cellular and granular casts, and characteristically vacuolated epithelial cells. In many cases with favorable progress, we have observed intense and brief albuminuria for 1 or 2 days toward the end of the clinical phase of the disease.

Postmortem Findings

The pathology of the disease is characterized by injury to the vascular system which is demonstrated by interstitial edema and degeneration of organs, especially the kidneys and liver.

Epithelial cells of the kidney show an indefinite border and granulous cytoplasm, with alteration of the nucleus. Hyaline and blood casts are seen in the tubular lumen. Intratubular hemorrhages are noted. In the epithelial cells of the convoluted tubules, a granular hyaline appearance is observed. The capillaries of the glomeruli are completely filled with blood.

Liver pathology consists of a granular degeneration of the cytoplasm in the hepatic cells. The central vein is dilated, and sinusoids contain a deposit of bile pigment. Edema is observed in the connective tissue surrounding the dilated central vein, as well as lymphocytic infiltration in some of the Kiernan spaces.

In the brain there is congestion with marked meningeal edema with some mononuclear infiltration (13).

Microbiological Findings

The search for the causative agent included two different microbiological approaches (3,8,12). In one field of research, bacteria and fungi were considered, while in the other, viruses and rickettsiae were investigated. Negative findings proved this disease not to be of bacterial (including leptospiral) or fungal origin (12). Infectious material was inoculated in mice, rats, guinea pigs, hamsters, pigs, monkeys, embryonated eggs, and tissue culture of monkey kidney, HeLa, and KB cells. Only guinea pigs were infected, as evidenced by illness and death within 15-20 days after inoculation. Necropsy showed the following pathological picture: petechial hemorrhages in the subcutaneous tissue, hemorrhagic abdominal lymph glands, intestines empty with small hemorrhages in the mucosa, hemorrhagic adrenal gland, and general congestion of internal organs. These animals were invariably negative for bacteria and fungi.

A suspension of organs from the infected guinea pigs was inoculated intracerebrally into white suckling mice 24 to 48 hours old. Consistently on the ninth day, disturbance in locomotion, muscular contractions, and, occasionally, paralysis were noted.

Further investigative work proved that the same symptoms could be produced in suckling mice by direct inoculation of original source material. Guinea pigs were susceptible by subcutaneous intraperitoneal and intracerebral routes, but suckling mice by the intracerebral and subcutaneous only. Suckling rats were found susceptible to intracerebral inoculation with brain from infected suckling mice.

As a result of this work, we have now three virus isolates, each from a different patient.

An unusual opportunity for epidemiological study of an outbreak of gastroenteritis was afforded when 171 campers became ill within a 30-day period at a Boy Scout ranch in New Mexico.

Outbreak of Nonbacterial Gastroenteritis at a Boy Scout Ranch

JOHN F. FOLEY, M.D., and TOM D. Y. CHIN, M.D.

NONBACTERIAL gastroenteritis is a self-limited disease characterized by an abrupt onset of nausea, vomiting, diarrhea, and abdominal cramps. The illness may appear sporadically or in epidemics. Most of the knowledge regarding this disease has been derived from studying outbreaks occurring in institutional populations (1-6).

During August 1957, an outbreak of gastroenteritis affecting 171 persons was observed on a Boy Scout ranch in New Mexico. The disease was similar to those previously described as epidemic diarrhea and vomiting or infectious nonbacterial gastroenteritis. This outbreak presented an unusual opportunity to study the disease from two standpoints: (a) to observe the behavior of the disease in four separate susceptible groups of people who came into the area at weekly intervals, and (b) to observe the occurrence of the disease in family constella-

tions. Clinical and epidemiological observations were made in these well-defined populations, and isolation of the virus was attempted.

The Setting

The Boy Scout ranch occupied an area of approximately 177,000 acres in the Sangre de Cristo Mountains. There were three major population centers designated as ranch headquarters, camping headquarters, and training center. The units were located approximately one-fourth to one-half mile apart. Ranch headquarters carried on the administrative affairs and served as the central depot for food, camping supplies, and other general items. After arriving at the ranch, Boy Scouts were quartered in tents at camping headquarters for 1 or 2 days prior to leaving on various camping expeditions in the mountains for the duration of their stay. During the months of June, July, and August, Scout leaders were given special training in the training center for 1 week to enable them to instruct local Scout heads in their respective communities. Tent homes were supplied for their families. Each Wednesday approximately 350 people entered the center and departed the following Tuesday by noon. Also living in the center were 86

Dr. Foley is an epidemic intelligence service officer and Dr. Chin is assistant chief of the Kansas City Field Station, Communicable Disease Center, Public Health Service. Bacteriological assistance was given by Dr. Daniel Johnson, director, public health laboratory, New Mexico Department of Public Health. The virus studies were supported in part by the section of virus research, University of Kansas School of Medicine.

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New Course in Chemical Analysis of Water

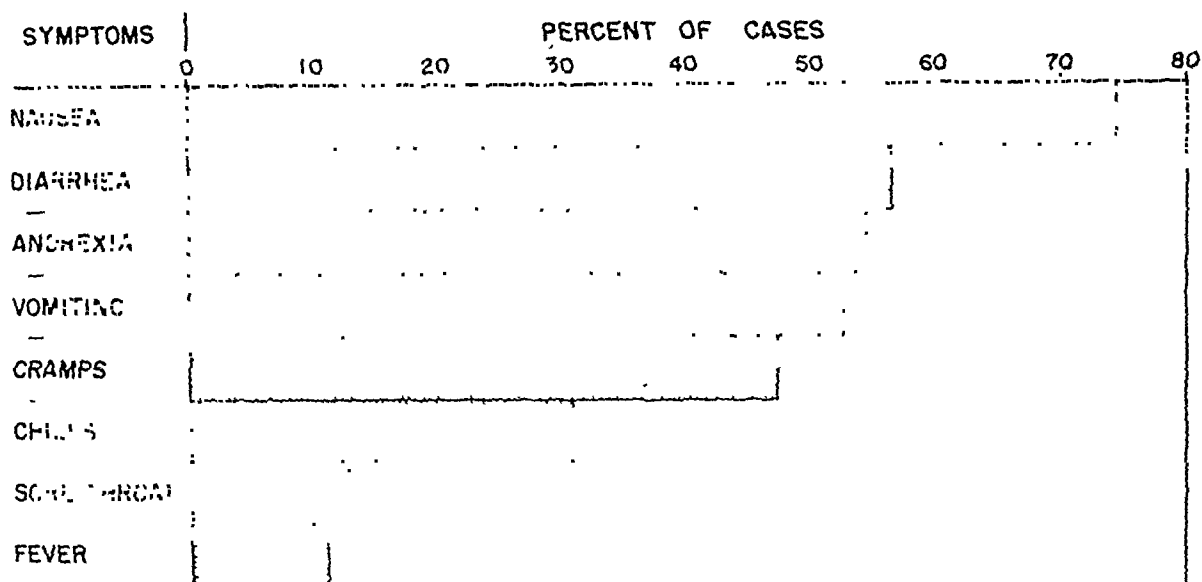
A course entitled "Chemical Analyses for Water Quality" will be conducted by the Robert A. Taft Sanitary Engineering Center, Public Health Service, from November 30 through December 11, 1959. Courses concerned with the same topic have been presented annually since 1949; the current offering, however, represents an entirely new approach. The trainees will study the determinations required at various stages in the life of a typical stream: its origin as a water resource, as it becomes polluted by sewage and industrial wastes, accomplishes self-purification, and again becomes a source of water supply for downstream communities.

Lectures and discussions will cover the types of determinations required, a review of current methods, and research investigations into new analytical procedures. In the laboratory sessions, the appropriate methodology will be critically studied and evaluated for precision, speed, and applicability.

Included on the faculty for this course are members of the research team at the center, as well as consultants from water supply and waste treatment industries.

Applications for the course may be obtained by writing to: Chief, Training Program, Robert A. Taft Sanitary Engineering Center, Public Health Service, 4676 Columbia Parkway, Cincinnati 26, Ohio.

Figure 1. Frequency of symptoms among 55 cases of gastroenteritis, Scout training center in New Mexico, August 1957



Feces and oropharyngeal specimens for viral studies were frozen at -20°C . or -70°C . Feces for bacteriological examinations were preserved in glycerine without refrigeration. Some of the specimens frozen at -20°C . were also studied for the presence of bacterial pathogens. Serums, after being separated from the clots, were stored at -20°C . Since the campers came from all parts of the country, it was not possible to follow them for subsequent illness after they left camp. However, convalescent serums were obtained from certain families.

Bacteriological studies were performed by the laboratory of the New Mexico Department of Public Health, using standard methods for isolation of enteric pathogens. Viral studies were performed in this laboratory using standard tissue culture techniques. The tissue cultures used were HeLa, human amnion and KB cells, and epithelial cells from monkey, guinea pig, and calf kidneys. One-day-old suckling mice were also used. All specimens were passed in suckling mice and monkey kidney epithelial cells at least once. Five to eleven representative specimens were passed two or more times in each of the tissue culture systems except that only primary passage was made in guinea pig epithelial cells. Specimens were examined also for the presence of hemadsorption viruses using

the technique developed by Chanock and associates (7). Guinea pig and chicken red blood cells were used in the test performed at a pH range of from 6.5 to 8.

Bacteriological and toxicological studies were performed on water samples collected from outlets at various sites on the ranch during the latter part of August.

Clinical Observations

The predominant symptoms were nausea, vomiting, diarrhea, and abdominal cramps. The onset was generally sudden; however, in some instances there were prodromes of malaise or slight nausea for a few hours. The sudden onset of vomiting or diarrhea usually ceased as quickly as it started. The patient felt quite well shortly thereafter, but in most cases another bout of vomiting followed 1 to 4 hours later.

The frequency distribution of individual symptoms observed in 55 patients is illustrated in figure 1. The most common symptom was nausea, which affected about 75 percent of the patients. More than half of the patients had diarrhea and vomiting. Vomiting was observed almost twice as frequently in children as in adults. Abdominal cramps occurred in about 47 percent, but chills and sore throat were less

staff members and their families, 76 of whom were employed for the entire 13 weeks and 10 for shorter periods.

The training center consisted of 186 tents each measuring 10 by 12 feet. Each tent was occupied by two persons. Parents and children usually occupied adjacent tents. Occasionally crowding made it necessary for parents to share a tent with one of their children. Also located in the training center were a number of permanent buildings for staff, residences, offices, dining hall, assembly hall, recreation hall, and infirmary. A few campers were housed in private cottages.

The tent area was divided into three parts designated as north tent city, south tent city, and south tent city east end. For ease in identification, these areas will be referred to here as A, B, and C, respectively. Each tent city had accommodations for more than 100 persons. General sanitation was excellent, and each tent city had separate modern lavatory facilities. All foods were prepared in a central kitchen. Residents of cities B and C shared a mess hall, but residents of city A ate in a separate dining area. Staff members ate in either mess hall, as they preferred.

The water used in all parts of the ranch came from a central processing plant. The raw water from the reservoir, formed by damming a creek, was treated by flocculation, sedimentation, and filtration. The purified water was chlorinated to contain 0.4 part per million of available chlorine, and daily records were kept of the tests performed on water samples from various sites on the ranch. Chlorine residuals were adequate during the entire period, and there was no evidence of gross contamination of the water supply.

All foods were obtained from a central commissary. The meat products came from a commercial packer, and pasteurized milk, supplied by a single distributor, was used in all areas.

Sewage from the camp headquarters and the training center was treated in Imhoff tanks, and the primary effluent, after being chlorinated, was further treated by subsurface filtration. Sewage from the ranch headquarters received no primary treatment before emptying into a ditch which drained into an area about one-half mile away.

A medical staff of one physician, three medical students, and two nurses served the ranch population.

Study Methods

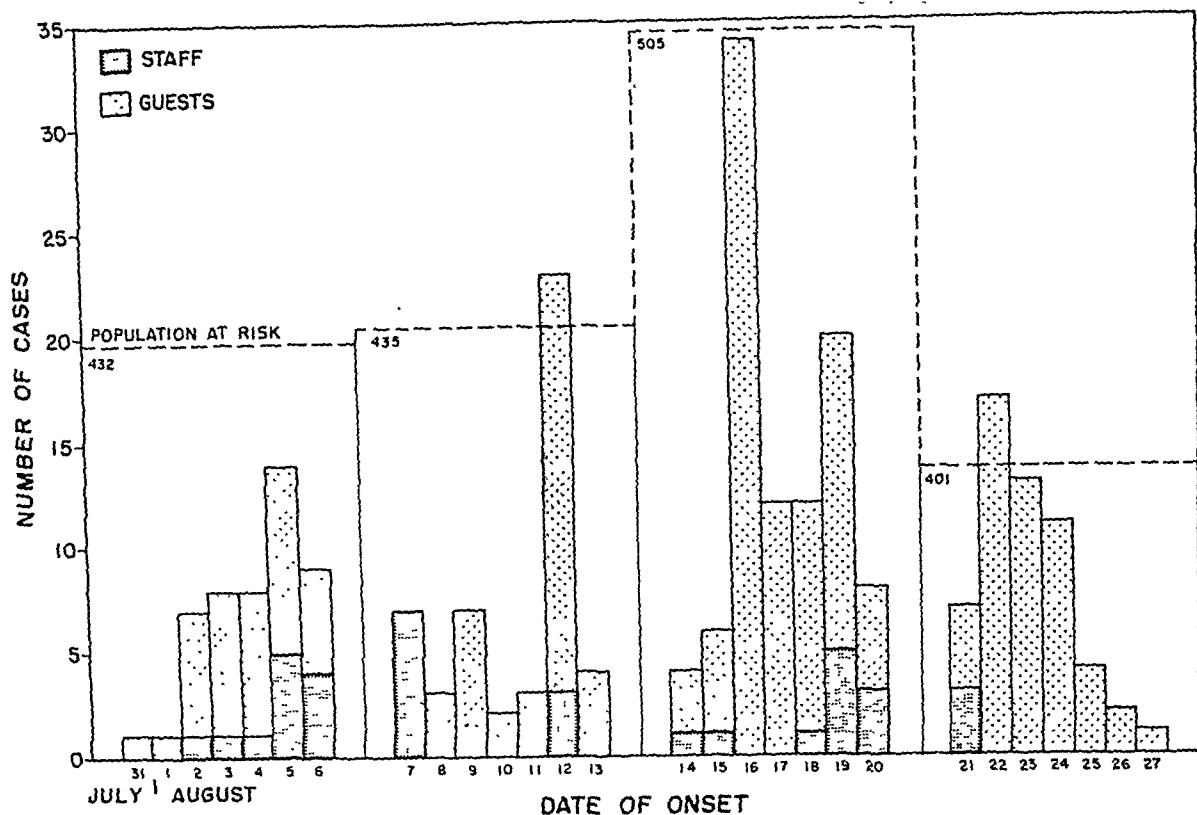
A systematic investigation was initiated on August 21, 1957, 21 days following the beginning of the outbreak, and terminated on August 27. All patients and their familial associates were interviewed and the data were recorded on standard questionnaire forms. All ill persons, upon reporting to the infirmary, were examined by Dr. Foley or by the medical students. Daily records were kept on all persons reporting to the infirmary for treatment. Prior to August 20 a daily logbook was maintained by the nurse in which she listed all persons reporting ill to the infirmary, together with a description of their major symptoms. These records were available for the previous 2 years (table 1).

Specimens for etiological studies, consisting of feces (stools or rectal swabs), oropharyngeal secretions (throat washings or swabs), and acute and convalescent serums were obtained from reported cases and their familial contacts.

Table 1. Reported incidence of gastroenteritis by month, Scout training center in New Mexico, 1955-57

Year	June			July			August		
	Total population	Number ill	Percent ill	Total population	Number ill	Percent ill	Total population	Number ill	Percent ill
1955.....	1,020	10	1.0	1,040	13	1.3	1,030	5	0.5
1956.....	1,006	7	.7	1,016	3	.3	1,020	7	.7
1957.....	956	10	1.1	1,100	24	2.2	1,459	171	11.7

Figure 2. Incidence of reported cases of gastroenteritis by date of onset, Scout training center in New Mexico, July 31–August 27, 1957



The number of persons reporting to the infirmary for diagnosis and treatment classified by date of onset of illness is illustrated in figure 2. It should be recalled that each weekly population at risk represented a new group of susceptibles, with the exception of the staff members and the group of families which remained over from the third to the fourth week of camp.

More than half of the illnesses in the first three groups occurred toward the end of the week, but the concentration of illness in the fourth group was observed during the first part of the week. The difference in the epidemic pattern observed in the fourth group may be partially explained by the fact that 58 persons who entered the camp during the third week remained

Table 3. Weekly incidence of gastroenteritis by tent city, Scout training center in New Mexico, 1957

Week ending	City A		City B		City C	
	Number persons	Percent ill	Number persons	Percent ill	Number persons	Percent ill
August 6	132	5	119	20	91	6
August 13	141	8	120	13	96	6
August 20	158	15	136	21	112	6
August 27	141	11	87	10	67	10
Total	572	10	462	18	366	7

NOTE: Each weekly population represents a new group of susceptibles. Staff personnel and families in cottages were not included. 58 persons staying from the third to fourth week were not included in the fourth group.

frequent complaints. Fever, with temperature ranging from 99.5° to 101° F., was observed in about 10 percent of the patients, although none was dehydrated. There was considerable variation in the severity of the disease.

Of the 55 patients, 17 had both vomiting and diarrhea, 12 had vomiting without diarrhea, 15 had diarrhea without vomiting. The remaining 11, who had neither vomiting nor diarrhea, had varying complaints but mainly nausea, abdominal cramps, and chills. The stools varied in consistency from pea soup to poorly formed; the frequency of bowel movements ranged from 2 to 25 times per day, with a median of 3. No pus or blood was seen grossly or microscopically. On physical examination, no remarkable abnormality was found. About 10 percent of the patients showed moderate injection of the pharynx, but this finding is probably the result of normal variations in random sampling. Hyperactive bowel sounds were evident on abdominal auscultation.

The average duration of illness was less than 24 hours, although some of the patients were ill for as long as 3 days. The duration of the illness was longer and the symptoms were somewhat more severe in adults than in children. Recurrences of the illness after recovery were uncommon. No deaths or complications were noted during the period of observation.

White blood counts were obtained on five children and five adults. The counts varied from 7,500 to 22,800 per cubic millimeter, with a median of 13,200. The number of leukocytes per cubic millimeter was higher in children than in adults, and the higher counts were associated with an absolute increase in the number of polymorphonuclear leukocytes.

Epidemiological Studies

An increase in the incidence of gastroenteritis was observed during the first week of August 1957, and abnormally high rates continued until the camp closed in the first week of September. The first case of gastroenteritis was noted, among a new group of persons who arrived on July 31, in a 2½-year-old child who became ill approximately 3 hours after arrival. On the following day, a similar illness was noted in a 5-year-old sibling of this child. On

the third day, five additional cases were observed among other families living in the same area.

Of 1,457 persons attending the Scout camp for 1 or more weeks during the month of August, 171 experienced an attack of gastroenteritis for an overall attack rate of 12 per 100 persons. This rate was considerably higher than the rates of the preceding months of June and July (table 1). Although the rate observed for July was higher than that of June or any other month during the preceding 2 years, the illnesses observed were scattered at random throughout the month with no abrupt peaking of cases in any one week. It appears, therefore, that the slight increase in incidence of gastroenteritis during July probably represents variations in seasonal incidence rather than cases occurring during the early phase of the outbreak in August.

The weekly incidence of gastroenteritis observed among campers staying only 1 week between July 31 and August 27, 1957, is shown in table 2. The attack rates ranged from 9 to 16 with an average of 12 per 100 persons. The highest rate was observed during the third week, when there was the greatest camp population. Attack rates were significantly higher among staff members and members of those families staying at the camp for at least 2 weeks. The rate for the staff members was 42 per 100 persons (36/86) and that for families staying at the camp for 2 weeks was 40 per 100 persons (33/58).

Table 2. Weekly incidence of gastroenteritis occurring at Scout training center in New Mexico, 1957

Week ending	Number persons	Number ill	Attack rate (percent)
August 6.....	342	35	10
August 13.....	357	33	9
August 20.....	406	63	16
August 27.....	295	33	11
Total.....	1,400	164	12

NOTE: Each weekly population represents a new group of susceptibles. Staff personnel and families in cottages were not included. 58 persons staying from the third to fourth week were not included in the fourth group.

gans. Neither 3-week-old mice nor various tissue cultures, including monkey kidney epithelial cells, HeLa cells, and human amnion cells were affected by the agents.

Cytopathogenicity was not observed in any of the tissue culture systems following inoculation of a selected number of specimens. A total of 28 specimens inoculated into monkey kidney epithelial cells and 25 specimens into calf kidney epithelial cells were tested for the presence of hemadsorption virus. No hemadsorption was observed under the conditions previously mentioned over a period of observation varying from 7 to 40 days.

Ten water samples obtained from outlets in various areas on the ranch during the course of the epidemic were tested for bacterial contamination. Coliform organisms were not detected in any of the samples. Also, two water samples tested did not reveal excessive amounts of inorganic compounds normally found in water or other inorganic substances that are capable of causing diarrhea.

Discussion

The clinical entity referred to as acute infectious nonbacterial gastroenteritis is an exceedingly common disease. It has been found by Hodges and associates (8) in a family study that gastrointestinal disorders are second in incidence to respiratory diseases. Gastrointestinal disorders consist mainly of cases of acute infectious nonbacterial gastroenteritis.

This disease usually begins abruptly with anorexia, nausea, vomiting, and diarrhea in varying combinations. Headache, fever, and leukocytosis may occur in some instances. On physical examination the distended colon can often be palpated and borborygmi can easily be heard. The disease is self-limited and of short duration. The more severe cases, particularly those in the older age group, may be complicated by dehydration, collapse, and, rarely, death (4, 5, 9). Although this disease may occur throughout the year, the peak incidence is in the fall and winter months.

The clinical picture observed in the present outbreak is consistent with that of acute infectious nonbacterial gastroenteritis as reported in other studies (1-6, 9). It is notable that

about 10 percent of the patients observed in this outbreak complained of sore throat. Whether these symptoms represent an integral part of the clinical picture of nonbacterial gastroenteritis or whether they merely represent a coincidental finding is difficult to determine, although several workers (2, 10, 11) have reported an increase in frequency of throat symptoms. Symptoms related to the respiratory system were not observed in this study. Fever was present in about 10 percent of the cases.

Attack rates among persons attending this camp were considerably lower than those reported in outbreaks of similar illnesses. The frequency of illness was undoubtedly related to the duration of exposure and the duration of observation. The incidence of gastroenteritis among campers staying 2 weeks and the permanent staff was more than three times higher than it was among campers staying 1 week. The attack rates in the former groups corresponded well to those reported in other outbreaks (6, 12) in which the period of observation was longer than 1 week. This relationship was reflected also by the secondary attack rates observed among family contacts. Secondary attack rates among campers would undoubtedly have been higher if it had been possible to follow the patients after they left camp. In a similar study made by Smillie and his co-workers (12), the secondary attack rate was found to be 43.7 per 100 persons. This rate was slightly higher than that observed in the families of staff members and in families staying 2 weeks at the camp.

Nonbacterial gastroenteritis is probably caused by a number of different viral agents. The assumption that some of the outbreaks described in the literature were due to viral agents is based on studies performed on human volunteers using fecal filtrates from patients with nonbacterial gastroenteritis as inoculums. Two immunologically distinct agents have been delineated, namely, the so-called Marcy and FS strains. The Marcy strain was isolated from a typical outbreak of gastroenteritis which occurred at Marcy State Hospital near Utica, N.Y., in 1946 (9); the FS strain was isolated from a patient with nonbacterial gastroenteritis

Table 4. Weekly incidence of gastroenteritis in tent cities by major age groups, Scout training center in New Mexico, 1957

Week ending	Under 18 years			18 years and over			Total		
	Popula- tion	Num- ber ill	Percent ill	Popula- tion	Num- ber ill	Percent ill	Popula- tion	Num- ber ill	Percent ill
August 6.....	167	26	16	175	9	5	342	35	10
August 13.....	190	15	8	167	18	11	357	33	9
August 20.....	186	31	18	220	29	13	406	63	16
August 27.....	139	18	13	156	15	10	295	33	11
Total.....	682	93	14	718	71	10	1,400	164	12

over during the fourth week; 10 of these 58 persons became ill during the first 2 days of the fourth week. Thus it was entirely possible that these 10 cases served to spread the disease widely among persons in the fourth group so that there were almost no susceptible persons by the middle of the week.

Shown in table 3 are the attack rates by tent city for each of the 4 weeks. During the first 3 weeks the incidence was significantly higher among persons living in city B than those living in the other two tent cities. During the fourth week the attack rates in persons living in the three tent cities were approximately the same. It is noteworthy that when the space between occupied tents in city B was increased during the fourth week, the incidence of gastroenteritis declined to that approximating those of the other tent cities.

Attack rates by age for the four groups are summarized in table 4. Incidence per 100 persons among those under 18 years of age was 14 as compared with 10 among those 18 years of age and older ($P=0.02$). This difference was particularly evident in the first group (week ending August 6), in whom the rate among children was more than three times that among adults. There was no difference in the sex distribution.

Multiple cases in families were common. The secondary attack rate among 371 familial contacts of those families staying only 1 week at the center was 15.4 per 100 persons. The average secondary attack rate among the families of staff members and families staying in the center for 2 weeks was significantly higher than that of the former group; of the 43 famil-

ial contacts in the latter group, the secondary attack rate was 37 per 100 persons.

All but 4 of the 57 secondary cases observed in families staying only 1 week at the center developed within 2 days after onset of the index case. Since the time interval between onset of first and secondary cases was so short, it is difficult to say whether these secondary cases were true secondary illnesses or whether they were co-primary cases acquired from the same source as the primary cases. Seven secondary illnesses in staff families occurred within 48 hours of the primary case.

Etiological Studies

Stools obtained from 11 patients were examined for presence of pathogenic bacteria and parasites. Enteric pathogens were not detected in any of the specimens.

Specimens obtained from 27 individuals were examined for the presence of viral agents. These consisted of 20 throat washings and 29 fecal specimens. All the specimens were tested in suckling mice and in various tissue culture systems mentioned previously. A total of four viral agents were isolated from two persons of the same family by inoculation of specimens into suckling mice. Two of the agents came from throat washings and the other two from fecal samples. The agents, although not definitely identified, probably were Coxsackie viruses of group A. All four agents, when inoculated into suckling mice, caused flaccid paralysis followed by death. Histologically extensive degeneration of the skeletal muscles was noted, with no lesions found in other or-

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Symposium on Venereal Diseases

The 11th Annual Symposium on Recent Advances in the Study of Venereal Diseases will be held April 7 and 8, 1960, in the Palmer House, Chicago, Ill. The sessions are open to all physicians and workers in this and allied fields who are interested in the venereal diseases.

Sponsored jointly by the American Venereal Disease Association and the Public Health Service, the symposium will follow a venereal disease seminar for public health personnel which begins April 4.

Persons wishing to present scientific papers on subjects related to venereal diseases should mail preliminary abstracts before November 25, 1959, to Dr. William J. Brown, Program Committee Chairman, in care of the Venereal Disease Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street, NE., Atlanta 23, Ga. These abstracts should give information sufficient to assist the program committee in making a decision as to acceptance or rejection of the papers. Authors of accepted papers will be notified before January 15, 1960. Final abstracts not exceeding 500 words will be required by March 1, 1960.

by Jordan and associates (13) in their Cleveland family study. Although these strains have been incriminated as etiological agents of nonbacterial gastroenteritis, they have not been cultivated as yet in the laboratory using various laboratory animals, media, and tissue culture cell lines (12,14-16).

The etiological agent causing this outbreak remains undetermined. The four Coxsackie-like viruses recovered from two members of a family undoubtedly represent coincidental findings and are not the principal cause of the outbreak. Pathogenic bacteria and amebas were excluded as causative agents on the basis of negative stool examinations and on the basis of clinical and epidemiological studies. The possibility that excessive amounts of inorganic substances were present in the drinking water was eliminated by appropriate tests performed on water samples collected from various points in the camp.

The mode of transmission of viral gastroenteritis has been a subject of considerable research. Early in the experimental work with human volunteers, Reimann and associates (17) reported that they were successful in transmitting the disease by aerosol spray with fecal filtrate obtained from patients with gastroenteritis. However, these investigators were unable to induce the disease in volunteers by ingestion of the same filtrate. Since that time, several other groups of workers (9,13,18, 19) have successfully transmitted the disease by feeding bacterial-free fecal filtrates to human subjects although no one has been able to confirm Reimann's original report relating to respiratory transmission. While it may be possible to transmit nonbacterial gastroenteritis by the respiratory route, the above experimental evidence seems to favor the fecal-oral route as the principal mode of transmission.

The data presented here are insufficient to establish whether the present outbreak was transmitted by the fecal-oral or respiratory route. It is quite certain, however, that the principal mode of transmission is by person-to-person contact. There was no evidence that the outbreak was caused by a common source either on the basis of the epidemiological data or on thorough examination of the water, milk, and food supply.

Summary

An outbreak of gastroenteritis affecting 171 of 1,457 persons occurred at a Boy Scout ranch during a period of 1 month. The clinical characteristics were similar to those described in acute infectious nonbacterial gastroenteritis. Four separate susceptible groups were involved in the epidemic. The attack rates varied from a low of 9 percent in campers staying 1 week to a high of 42 percent in staff members. Attack rates were significantly higher in children. Multiple cases in families were commonly observed. Secondary family attack rates varied from 15.4 percent in those families staying 1 week to 37 percent in the staff families and campers staying more than 1 week.

Laboratory studies for enteric pathogens were negative. Viral studies using suckling mice, various tissue culture lines, and hemadsorption techniques failed to uncover an etiological agent.

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SOCIAL PATHOLOGY

IN its 80th year, the Massachusetts Public Health Association at Amherst, September 2, 1959, offered a fresh if not entirely new wrapper for the traditional package of public health.

With Dean Clark, M.D., general director, Massachusetts General Hospital, presiding, a panel of four discussed social pathology and its implications in epidemiology. After an introduction of the subject by Raymond F. Gould, Ph.D., of the National Institute of Mental Health, Public Health Service, Leon Sternfeld, M.D., commissioner of the Cambridge Health Department, suggested broad applications of knowledge of social pathology to public health practice. Other specific examples were provided by Robert Morris, associate professor of the Graduate School for Advance Studies in Social Welfare at Brandeis University, with respect to dependency; and by the late Kenneth W. Chapman, M.D., formerly associate director of the Clinical Center, National Institutes of Health, Public Health Service, speaking of studies of addiction to narcotics.

The Dynamics

Observing that the obvious symptoms of social pathology are found in records of crime, delinquency, family disintegration, alcoholism, and poor working habits, Gould suggested that social health "is to perform so as to survive and to anticipate changes which may threaten survival." For example, he said it is socially healthy to take preventive action against the anticipated effects of atomic warfare, urban sprawl, or overpopulation. It is also socially healthy, he suggested, to develop methods of

satisfying such universal human needs as physical maintenance and protection; the need to make the most of one's self; the need to relate with others competently; and the need to see things as they really are, well enough to manage affairs and to move in new directions, if necessary.

Assuming that an infant can develop in any direction, given nurture, support, and control by family, neighborhood, and government, Gould asserted that when proper nurture, support, and control are lacking, social pathology sets in.

To illustrate his thesis, he described a fictional tribe of Bongo-bongos, living in an economy of scarcity, with an average life expectancy of 30 years, subject to chronic famine and war, where each individual's identity depended either on fighting or food gathering. In such a system, the aged were discouraged: it was cheaper to bury them than to keep them. With a simple model of parenthood, education for girls consisted of learning to be a wife and mother, and for boys, to be a farmer and fighter. Deviants, unsuited to such roles, did not survive. Under the necessities of their condition, however, the Bongo-bongos were socially healthy: as a tribe, their survival value was high.

In contrast, he noted, the complex demands of today's America require long training and advance planning for youth. Although deviants are protected, they are not helped to satisfy their basic needs. Many receive only custodial care at best, and most are on a bare subsistence budget. The elder members of society, although they are preserved, are neglected; an increasing number of unhappy, inadequate citizens. To waste such human resources while

Experience of First Admissions to State Mental Hospitals

This study represents the cooperative effort of the statistical officers in 11 states in the Model Reporting Area for Mental Hospital Statistics and the Biometrics Branch, National Institute of Mental Health. The project, which grew out of a desire to compare data on the flow of patients into and out of the mental hospitals of the various States, had four major objectives. The first was to illustrate the mechanics and problems of conducting a cooperative study among 11 individual governmental organizations, widely separated geographically, where the study focuses on a complex problem requiring careful definition and analysis. The second was to present data on the probabilities of release, death in hospital, and continuous hospital residence for specified periods of time following first admission for different State mental hospital systems. The third was to emphasize the ways in which the basic data differ among States and to discuss the problems of interpreting interstate differences resulting from the incomparability of these data. The fourth was to delineate types of data, methodology, and special studies needed to obtain meaningful interstate comparisons.

The data presented indicate great variability among States in proportions of first admissions released, dying, or retained continuously in the hospital during the first year following admission. However, the primary emphasis of the monograph is on a discussion of the complex intra and extra hospital factors that affect interstate comparisons of the data. These factors include legal categories of admission, severity of illness at admission, population characteristics of the States, policies of the hospitals which affect admission or release, and the use of general hospitals, outpatient psychiatric clinics, and other community psychiatric facilities. As the discussion of these factors develops it becomes increasingly clear that the probabilities of release, death, and retention in the hospital

as presented in the monograph cannot be used as indexes of the therapeutic efficiency of the State mental hospital systems.

The authors discuss statistical adjustments of probabilities of release and death which would take into account the effect of the factors mentioned above. They emphasize that to refine further interstate comparisons of these probabilities studies are needed to determine the level of community adjustment of patients released from the hospital and the rate at which these patients return to the hospital. In these investigations it is extremely important to study the State mental hospital in relation to the entire range of facilities in the community for the care of psychiatric patients.

Public Health Monograph No. 58

Patterns of Retention, Release, and Death of First Admissions to State Mental Hospitals. By Earl S. Pollack, Philip H. Person, Jr., Morton Kramer, and Hyman Goldstein. Public Health Monograph No. 58 (PHS Pub. No. 672), 54 pages, illustrated. U.S. Government Printing Office, Washington, D.C., 1959, price 40 cents.

The accompanying summary covers the principal contents of Public Health Monograph No. 58, published concurrently with this issue of Public Health Reports. With the exception of Dr. Goldstein, who is with the National Institute of Neurological Diseases and Blindness, the authors are with the National Institute of Mental Health, Public Health Service.

For readers wishing the data in full, copies are on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Official agencies and others directly concerned may obtain single sample copies without charge from the Public Inquiries Branch, Office of Information, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

With due regard for the importance of physical or emotional dependency, or the general interdependence of human society, he confined the bulk of his remarks to economic needs.

A typical economically dependent person at the end of the 19th century, he said, was the orphan, served by orphanages and charitable funds set up to provide aid for mothers. The needs of orphans helped to inspire milk stations and other preventive health services which preceded many modern programs and played a great part in reducing orphanage.

Full orphans have almost disappeared, making up less than 0.1 percent of the child population. The number of children bereft of one parent has been reduced by between one-sixth and one-third in the past 25 years alone. Their needs are met mainly by the Social Security Administration program of aid to dependent children.

Chronic illness and aging today produce dependency at the other end of the life cycle, he added. Parents do not die young and leave dependent children, but survive to become dependent in their later years. Of 500,000 families on public assistance in New York State in 1958, he said, only 10 percent were able to work. Most are chronically ill and often they are bedridden, he said, for lack of adequate rehabilitation services. In many government hospitals, he stated, one bed in five is occupied by a long-term patient for social, not medical reasons. And this improper use of hospital beds he laid to inadequate use of social resources—nursing homes, home care programs, boarding homes, and other social services.

He recommended increasing services to the homes of the dependents, with emphasis on rehabilitation. Specifically, he cited the example in Chicago of collaboration by public health officials, public welfare services, and general hospitals, concentrating on nursing home patients receiving old age assistance. In one situation he described, three-fourths of the inactivated patients were able after 1 year to take care of their own physical needs, thanks to combined medical and social services.

The success of such a program for aged dependents, he said, rests on confidence in its success, a comprehensive provision of health,

rehabilitation, and social services; continuity of care; and coordination among agencies in a community organized so as to mobilize its social resources.

Addiction

The social pathology of addiction to drugs and alcohol, Chapman observed, characteristically but not invariably is associated with a hostile environment, dependency, poverty, an unstable or broken home, crowding, and racial handicaps. But while about half of the alcoholic addicts may perform productive work, he said, drug addicts are much less useful. Drug addiction also is less tolerated in this country, he added, than alcoholism. Social attitudes, therefore, have tended to encourage segregation or incarceration of drug addicts. The laws on addiction generally are at least as punitive as therapeutic. The forces behind addiction are seldom understood by families or associates of the victims, and still less do untrained persons understand how to manage addicts, he said. On the contrary, the attitudes of family members may constitute a specific force behind the impulse to take drugs or alcohol.

In the management of addiction, he said, social attitudes are of key importance. All hands are needed to help in rehabilitation of addicts if rehabilitation is to succeed. And that achievement, he said, implies much more education of the public and far better scientific knowledge of the nature of addiction.

Referring to an effort by the Public Health Service to evaluate its work at the Lexington hospital for narcotic addicts, he reported that investigators followed up more than 1,800 patients discharged to the New York City area between July 1952 and the end of 1956. In the course of the effort to learn the fate of these former patients, it appeared that many needed continuing support. On their own initiative, the investigators undertook a long-term rehabilitation program for a few. Without such continuing support for the social and emotional needs of the narcotic addict, Chapman said, the chances are slim that the task of rehabilitation so well begun in the hospital will carry through for long.

we compete with other societies which are stressing productivity and the common good, he said, is a dangerous extravagance.

Other factors in the failure to develop survival values, he observed, are the lack of emotional care for children of middle-class urban parents, largely distracted by the pressures of meeting occupational obligations or the physical demands of an overwhelming technology. Lacking a stable value system in the home, school, or church, he said, young people feel life is meaningless and that the world has no place for them. In his opinion, urbanization in itself deprives society of the social controls and support which individuals find in the rural setting, where the individual is relatively prominent and well-identified. To offset these pathological developments, Gould concluded, public health agencies have a major responsibility, since anticipatory action is the price of survival.

Applied Knowledge

Sternfeld cautioned the attentive audience against a glib approach to social issues. Winslow's definition of public health as social well-being, he said, is an objective, rather than a condition; but it is also more than a pious hope. It has the wisdom of seeing that low rates of morbidity and mortality will not by themselves achieve this objective. "Your agency will fail if it seeks to reform the world," he said, "but neither can you say that social pathology is no concern of ours." As he was about to name specific points of attack, he remarked, "I can hear the public health nurse saying, 'What! Something else added to the caseload!'" But he proceeded to suggest that nurses and sanitarians are in a strategic position to share information on housing and family conditions which breed social pathology. "Liquidation of the physical slum is futile," he said, "if the relocated family is certain to create a new one."

Equally futile, he added, is transfer of a family from a condemned house to a worse one. The correction of housing defects at a cost reflected in rent increases, which simply drives out the present occupants, may be self-defeat-

ing, he explained. Such conditions, he said, demand concerted action by all agencies concerned.

He mentioned venereal disease as another familiar public health responsibility associated with social pathology, differing from other infections in its profound social and psychological implications. (This specific topic was discussed at another session by Dr. Nicholas Fiumara, director of venereal disease control, Massachusetts Department of Public Health.)

With respect to a third conventional field of public health work, tuberculosis, Sternfeld emphasized the social needs of patients in custody, and their management and reception in the community after discharge. The frequency of alcoholics in the tuberculosis wards also calls for an attack on social causes, he added.

As to maternal and child care, he proposed a concentration of efforts upon the most susceptible elements of the population, asserting that the differential rates of maternal mortality by neighborhood in many cities is not ordinarily known, and that the frequency of stillbirths, premature births, and infant deaths is certainly higher in handicapped families; the socially, economically, and emotionally handicapped.

Such handicapped families, he said, tend to be regarded as social lepers, as once were patients suffering from tuberculosis or cancer, and as are mental patients or patients with venereal infections, to some degree, today. On the principle that a multiplicity of needs warrants a multiplicity of services, he proposed that health agencies and others concerned focus upon such special risk groups. Sternfeld predicted that the results would be commensurate with the effort. And he expressed confidence that the effort could overcome the stubborn barriers of ignorance, cultural prejudices, and the current deficiency of facilities and services. Offering no magic recipes for the attack on social pathology, he said that available knowledge can provide useful recommendations.

Dependency

Recommendations for action on dependency were expressed by Morris, after a backward look at the evolution of maternal and child care.

The Importance of Vital Records in Today's Society

HAZEL V. AUNE

A RECENT issue of a popular national magazine (1) described what is to date probably one of the most dramatic uses of marriage and death records. Entitled "A Most Valuable Accident," it is the story of the people who swallowed varying amounts of radium during World War I and on into the thirties. Most of them were the girls who painted the radium figures on watch dials. They found that their work went faster and more accurately if they licked their paint brushes to a point. A number of them died in the early nineteen twenties. Others have died since, but many are still alive.

The Atomic Energy Commission, as a part of its program of collecting all available information about the effect of radioactivity on human beings, is searching systematically for the survivors. The research team provided by the New Jersey State Department of Health, together with a detective from the State police are, in essence, conducting a "missing persons" search to track down and study the dial painters. To trace them, all available records are used. Marriage records are reviewed by the clerks of the vital statistics office in an effort to learn the present names of some of the girls. Death certificates are checked, not only to preclude vain hunts but also to learn presumed causes of death. This is a logical and practical use of vital records.

Most people take vital records for granted; assume we have always had them and, without much effort, will continue to have them available when we need them. The real story is quite different. It has taken more than 300 years to build our registration system. Even

today some vital events escape the registration network. For example, 11 areas have no centrally filed marriage records and 16 areas, no divorce records.

Looking backward, perhaps it is fortunate that our early settlers, predominantly English, were accustomed to the registration of christenings, marriages, and burials. This custom, no doubt, had its part in influencing the Grand Assembly of Virginia in 1632 to require ministers or wardens from every parish to provide at court on June 1 each year a register of christenings, marriages, and burials (2). These were the traditional events conducted by the church, but, in effect, they provided an account of births, marriages, and deaths.

In the beginning, the records were primarily for the protection of individual rights, especially those rights relating to the distribution of property. The emphasis on vital records as legal documents to protect both the individual and the community was first reflected in the 1639 law of the Massachusetts Bay Colony. The law departed from past practice by requiring government officers rather than the clergy to record births, deaths, and marriages (3), and formed the pattern for the laws adopted by Connecticut and New Plymouth, and, eventually, other colonies.

None of the early laws was particularly effective.

Mrs. Aune is chief of the National Consulting Service, National Office of Vital Statistics, Public Health Service. The article is based on a paper she gave at the 27th annual meeting of the Southern Branch, American Public Health Association, at Miami, Fla., on May 27, 1959.

Greek Chorus

In the role of a Greek chorus, the chairman and others provided several supplementary items at intervals for consideration by the audience.

There are now approximately as many beds in nursing homes as in general hospitals.

About 1,000 new persons are added each day

to the number of people in this country who are more than 65 years old.

Old-Age and Survivors Insurance today is paying benefits to more than 10,000 persons who are more than 100 years old.

One marriage in four ends in divorce.

The number of alcoholics in this country is estimated at 5 million; mental patients, 15 million.

Nursing Traineeship Program Extended

Expanded opportunities to increase skills in management of nursing services are available to nursing supervisors, administrators, and teachers. Federal funds have been set aside to enable key personnel in the nursing profession to attend short-term intensive training courses. The Division of Nursing Resources, Public Health Service, will award grants to the institutions or agencies giving the training courses.

The program is an extension of the professional nurse traineeship program which for the past 3 years has supported traineeships for nurses preparing for supervisory, administrative, and teaching positions in colleges and universities. Legislation continuing the program for 5 years has been passed by the Congress.

Short-term traineeships will be limited to graduate professional nurses now employed as administrators, supervisors, or teachers, for whom advanced full-time study is not now possible. The grants will cover tuition and fees for the course plus a stipend when necessary.

The Public Health Service must approve plans for any institution or agency to supply the new training courses. Criteria for participation are available from the Division of Nursing Resources.

Traineeships for nurses enrolled in full-time academic programs will continue to be available.

and death certificates when in 1900 the APHA committee on demography was preparing a set of basic principles to guide States in preparing laws for the registration of deaths and the collection of mortality statistics. These principles, together with the first standard certificate of death, were adopted by the Bureau of Census in 1902, and were published in a circular (11) which was sent to the governor of each State, medical societies, journals, and others interested in registration. This document was extended in 1903 to cover the registration of births and included the first standard certificate of birth (12).

The broad registration principles were prescribed in the first model law of 1907. The model law gave the State boards of health central authority over registration matters, listed the items for inclusion on State certificates, specified responsibility for registering births and deaths, provided for the establishment of local officials and for the issuance of burial permits, and called for enforcement of the law. The major new items introduced in subsequent revisions of the law include marriage and divorce registration, a standard certificate of fetal death, provisions for delayed registration and alteration and amendment of vital records.

Although every State had passed registration laws (13) of a sort by 1911, the Bureau of the Census did not create the national birth registration area (14) until 1915. By then, the death registration program was established on a firm basis. In 1933, for the first time, both the birth and death registration areas included all States. Only since that year have the annual vital statistics publications been based upon data from the entire United States.

This does not mean there were no vital statistics published from 1900 to 1933. The annual collection of mortality statistics began in 1900. The first published report combined in one volume the statistics for the 5-year period 1900-04 for the States and cities in the death registration area. However, no birth statistics were published by the Bureau from 1900 until 1915. The earliest statistics on marriages and divorces for the 20-year period 1887-1906 were obtained from a survey by the Census Bureau; in addition, some 1867-86 data were summarized from an earlier survey by the Commissioner of

Labor (15). Similar surveys and, on occasion, more systematic collections provided intermittent publication of limited marriage and divorce statistical data until 1949, when the National Office of Vital Statistics began a program of detailed statistics based on State tabulations. The registration area for marriage was established on January 1, 1957, and, for divorce, on January 1, 1958. Just when all States will be included in these areas is the major question of the registration system today.

Lest I may have given the impression that registration of vital events, and more particularly of births, was motivated primarily by officials interested in their use for statistics, note S. N. D. North's quotation (12) of Dr. John S. Fulton on the direct interest of the individual citizen in 1903:

"The private interest of the citizen in registration of births is indeed superior to his interest in registration of deaths, for a greater proportion of his privileges and immunities, rights and duties, turning upon the question of his age and his parentage, are definitely conserved by the registration of his birth.' Some idea of the frequency with which questions arise requiring reference to the records of births may be gained from the fact that the calls for copies of records or for information contained in them in New York City during the year 1902 exceeded 3,000."

Of course, this is only a tiny fraction compared with the hundreds of thousands of copies of birth, death, marriage, and divorce records issued and used for various purposes today. But the use of vital records even in 1902 demonstrates that our registration and statistics system came about not by mere chance but in response to demands for records as well as statistics. The need for legal documents with evidentiary value increased greatly as society became more complex and man began to be required to prove his right to his name, his citizenship, and his place in society.

Each day society is creating new and increasing demands on the vital records system. As medical advances are made, for example, vital records grow in importance and more and more data are sought through the records.

Sirken and Dunn (16) have discussed the development of sampling survey methods and

tive in promoting registration, probably because practically the entire justification for maintaining a registration system was the legal and historical use that could be made of the records.

For the next 200 years, nothing of significance was done to make registration more effective. During this time death lists and burial returns were occasionally used as a means of recognizing and fighting epidemics, or for reporting on health conditions in a given community.

Early in the 19th century, a few statisticians and medical men began to realize that records of births and deaths, particularly records of deaths by cause, were needed for the control of epidemics and the conservation of human life. In 1812 Massachusetts passed the first "modern" registration law (4). As revised in 1844, the law provided for uniform certificates to be used throughout the State and for the establishment of a statewide file of copies of the records.

At about this time national organizations first took a direct interest in registration. Among them was the American Medical Association, which in 1847, the initial year of its organization, appointed a committee to study ways and means of improving the registration of births, deaths, and marriages (5). Several years later, the association formally urged physicians throughout the country to request their States to establish offices for the collection of vital statistics.

How were statistics compiled at that time? The first effort to collect national birth and death statistics occurred in 1850. One hundred years ago, in 1860, when the Nation's population was nearly 31.5 million, the marshals of the U.S. Census Office enumerated less than 1 million infants under 1 year of age and less than half a million deaths (6). Now, a century later, our population is almost six times greater; more than 4 million births and over 1.5 million deaths are recorded annually. Marriages and divorces, combined, account for nearly 2 million more vital events (7).

Admittedly, in 1860, the marshals knew that more babies were being born and many more people were dying, but had to rely on the memories of their informants. There is abundant evidence that vital events were recalled and re-

ported in proportion to the recentness of occurrence. Furthermore, no record was made and no account taken of those who died in taverns, boarding houses, on shipboard, in boats on rivers, and so on. With such reporting deficiencies, it is not surprising that the apparent death rate varied from approximately 5 per 1,000 in Washington Territory, to 21 per 1,000 in Arkansas. Enumeration totals were actually compared with the death record totals in the seven States which required birth and death registration in 1860. In three States the marshals discovered a smaller number of deaths than were reported by the State authorities, and, in the other four, they discovered and reported more (8).

Despite the inadequacies, birth and death figures for the entire country were compiled largely from the reports of the census enumerators through the 1900 census because the only alternative was no national statistics at all. Meanwhile, however, aware that vital data could be satisfactorily collected only by the registration method, the Census Office established the "registration area for deaths" in 1880 (9). As a matter of fact, in certain large cities where a complete death registration system based on burial permits was in operation, no data on deaths were collected by the enumerators in 1880, 1890, and 1900. The records from the central registration offices of these cities were used instead (10).

In 1902, the Bureau of the Census was made a permanent agency by an act of Congress. The act authorized the director of the Bureau to obtain copies of records filed in vital statistics offices of such States and cities as, in his discretion, could provide satisfactory data. To develop a collection system capable of producing comparable statistics on a national basis required uniformity with respect to such matters as laws, forms, and procedures. Numerous organizations cooperated with the Bureau in tackling and accomplishing this task.

The American Public Health Association had been actively promoting uniform State registration and model laws for many years. In fact, in 1895 members of the association had proposed that it either draft a model law or set forth principles. No two States and few cities were using precisely the same forms of birth

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PUBLICATION AND FILM ANNOUNCEMENTS

Address inquiries to the publisher or sponsoring agency. WHO publications may be obtained from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.

When a Family Faces Cancer. Public Affairs Pamphlet No. 286. By Elizabeth Ogg. July 1959; 28 pages; 25 cents. Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y.

The One-Parent Family. Public Affairs Pamphlet No. 287. By Anna W. M. Wolf and Lucille Stein. August 1959; 28 pages; 25 cents. Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y.

How Retarded Children Can Be Helped. Public Affairs Pamphlet No. 288. By Evelyn Hart. September 1959; 28 pages; 25 cents. Public Affairs Pamphlets, 22 East 38th Street, New York 16, N.Y.

Added Years. Monthly newsletter of the New Jersey State Division of Aging. September 1959 (first issue); 4 pages. State of New Jersey, Division of Aging, Trenton 25, N.J.

Cancer in California. Prepared by California Tumor Registry, Bureau of Chronic Diseases, California Department of Public Health. 1959; 47 pages. State Department of Public Health, Berkeley 4, Calif.

Dental Public Health in New York State. A review on the occasion of the American Dental Association Centennial, 1859-1959. 1959; 41 pages. New York State Department of Health, Albany, N.Y.

The Status of World Health, in Outline Text and Chart. Prepared for the Committee on Government Operations, United States Senate, and its Subcommittee on Reorganization and International Organizations. 1959; 81 pages; \$1.25. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

The Air Pollution Bibliography. Volume II. Compiled by the Bibliography Section, Science and Technology Division, Library of Congress for the Public Health Service. 1959; 176 pages. Single copies available without charge from Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

The Cost of Medical Care. Studies and Reports, New Series No. 51. 1959; 216 pages; \$1.50. International Labour Office, Washington Branch, 917 15th Street NW., Washington 5, D.C.

Manual of Industrial Radiation Protection. Part II. Model Code of Safety Regulations (Ionising Radiations). 1959; 54 pages; 75 cents. International Labour Office, Washington Branch, 917 15th Street, NW., Washington 5, D.C.

Film

Back on the Job. Film showing how heart attack victim is returned to employment, produced for the American Heart Association. Written and directed by George C. Stoney, assisted by Katherine Stoney, Potomac Films. 16 mm., black and white, sound, 14½ minutes. Distributed

nationally for showing to lay and professional audiences by the Association's affiliates and chapters.

World Health Organization

Resolutions and Decisions of the Twelfth World Health Assembly, Geneva, May 12-29, 1959. (Offprint from Official Records of the World Health Organization No. 95.) August 1959; 52 pages; 70 cents.

Iron Deficiency Anaemia. Report of a Study Group on Iron Deficiency Anaemia. WHO Technical Report Series No. 182. 1959; 30 cents.

Social Psychiatry and Community Attitudes. Seventh Report of the Expert Committee on Mental Health, Social Psychiatry and Community Attitudes. WHO Technical Report Series No. 177. 1959; 30 cents.

Role of Hospitals in Ambulatory and Domiciliary Medical Care. Second Report of the Expert Committee on Organization of Medical Care, Role of Hospitals in Ambulatory and Domiciliary Medical Care. WHO Technical Report Series No. 176. 1959; 30 cents.

Preventive Aspects in the Teaching of Pathology. Seventh Report of the Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel, Preventive Aspects in the Teaching of Pathology. WHO Technical Report Series No. 175. 1959; 30 cents.

Hygiene and Sanitation in Aviation. First Report of the Expert Committee on Hygiene and Sanitation in Aviation. WHO Technical Series No. 174. 1959; 60 cents.

conduct of studies to collect supplementary statistical data "anchored to vital records." Their paper described the Pennsylvania mortality study, the methodological study undertaken primarily to develop procedures of collecting information to supplement data contained in death certificates. The study also served as a pilot test for an epidemiological lung cancer study.

A paper on residence history of deceased persons was presented at the recent Population Association meeting at Providence, R.I. And a survey has been conducted to determine the extent to which deceased persons recently received care from hospitals, nursing homes, and sanatoriums during a 1-year period prior to death.

Another survey, the national lung cancer study, using the methodology of the Pennsylvania mortality study, has been extended for a year for cancer deaths in females, but the bulk of information has been collected on smoking habits and residence history. Coding, punching, and tabulating operations are well underway. In the interim one statewide pilot study is in progress to establish the quality of diagnostic information on death certificates for which the coded underlying cause is either malignant neoplasm of the bone or buccal cavity.

Another illustration of society's growing demands on vital records is the task of providing vital records for Americans abroad. This past year, more than 800,000 of our citizens traveled abroad. Each traveler had to prove his birth facts to obtain a passport. These travelers, together with our military personnel stationed in foreign countries, reported nearly 50,000 births to U.S. consular officers throughout the world. Providing satisfactory birth record service for children born abroad who are U.S. citizens is a problem second only to that of obtaining birth certificates for the increasing number of alien children being adopted in the United States. The interagency committee, formed at the request of the Association of State and Territorial Health Officers and the American Association for Vital Records and Public Health Statistics, is making progress toward solution of these problems. At the committee's next meeting, specific concrete recommendations for

new and improved record services for these events should emerge.

These are only a few of the many ways in which the use of vital records can affect man and society. There are many more, from planning for school facilities 5 years hence, when the birth records show there will be a tremendous increase of 6-year-olds in the population, to demands, yet unknown, for planning in the atomic space ages.

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Federal Publications

Algae in Water Supplies. *PHS Publication No. 657; 1959; by C. Mervin Palmer; 88 pages; \$1.*

This illustrated manual on the identification, significance, and control of algae has been prepared for technicians in water treatment plants and others who deal with algae in water supplies.

Algae are described and shown in color according to their occurrence with taste and odor, filter clogging, pollution, and clean water. Considered separately according to habitat are algae growing on reservoir walls and plankton and other surface water algae. Special attention is given to the beneficial part algae play in sewage treatment as well as the problems they cause. Procedures for enumerating algae are also discussed.

References to related literature are listed at the end of each chapter. The appendix includes a key to algae of importance in water supplies, glossary, bibliography, and genus and species index.

Professional Nurse Traineeship Program.

Part I. A report of the national conference to evaluate two years of training grants for professional nurses. *PHS Publication No. 675; 1959; 62 pages; 30 cents.*

Part II. Facts about the nurse supply and educational needs of nurses based on data compiled for the national conference to evaluate two years of training grants for professional nurses. *PHS Publication No. 676; 1959; 47 pages; 25 cents.*

Part I is the report to the Surgeon General, Public Health Service, by an evaluation conference which met in Washington in August 1958. It presents views and recommendations of nursing, health, and education leaders on how to fulfill the demand for leaders in nursing and an analysis of the Federal Government's first grant program to help professional nurses obtain advanced education in

teaching, administration, and supervision. The appendix includes data on nursing needs as they relate to the program and describes the conference meetings.

Part II is a revision of a source book prepared for orientation and guidance of the conferees. It contains data on nurses who received funds through the program, needs for nurses in top leadership positions, schools where nurses may receive advanced training, and public health agencies, nursing homes, and industries which employ these nurses.

Highlights of Progress in Research on Cancer, 1958. *PHS Publication No. 671; 1959; 46 pages; 25 cents.*

Summaries of selected research findings in virology, pharmacology, epidemiology, and other scientific disciplines reflect significant accomplishments in clinical and laboratory investigation by staff scientists and grantees of the National Cancer Institute, Public Health Service. The items are organized under four broad headings: causation, characteristics, diagnosis, and treatment of cancer.

Fertility Studies Based on Data for the 1960 Census Period. *Vital Statistics—Special Reports; Selected Studies; vol. 47, No. 5; June 8, 1959; pages 145-157.*

Calling for the widest possible participation in and support for studies of fertility, this report considers the kind of fertility studies that might be made from vital and population statistics for 1960 and indicates the ways in which the data should be tabulated in order to make such studies possible. It was prepared by the Subcommittee on Fertility and Population Statistics of the National Committee on Vital and Health Statistics.

Topics suggested for study include concepts of family size; effect on fertility of the dissolution of marriages by divorce or death, and of

remarriage; interrelationships between changes in economic conditions and fertility; birth spacing; and the evaluation of data collected by the National Office of Vital Statistics and the Bureau of the Census.

Interviewing Guides for Specific Disabilities. Pulmonary tuberculosis. *U.S. Department of Labor Publication (unnumbered); revised 1959; 10 pages; 5 cents, \$3.75 per 100.*

Directed to industrial physicians, placement and rehabilitation workers, and employment service staff, this folder outlines the latest information on the treatment, rehabilitation, and employment of tuberculosis patients. It was prepared with the assistance of the National Tuberculosis Association.

The new guide, retaining the established format of the series, is divided into four sections: description of the disability, evaluation of work capacity, definitions, and cooperating agencies.

Sewage and Water Works Construction, 1958. *PHS Publication No. 673; 1959; by William H. Abbott and Elsie M. Gibson; 14 pages; 20 cents.*

Contracts awarded during calendar year 1958 for constructing sewage treatment plants, collecting sewers, and water systems are itemized in this report. Tables present data arranged by States, population groups based on community size, and contract size groups.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

The Public Health Service does not supply publications other than its own.

Signs

and

Symptoms

of trends in public health

A set of suggested guides for medical care in nursing homes and related facilities has been developed and approved jointly by the American Nursing Home Association and the Council on Medical Service of the American Medical Association. The guides appear in the August 1959 issue of *Chronic Illness*.

“ ”

Jurisdiction over nursing homes was assigned by the Legislature of Ohio to the State department of health, beginning September 7, 1959.

“ ”

Fluoride added to water does not increase corrosion of common household metals, Sanitarian Joseph A. McCarthy reports in *Sanitalks*, quarterly publication of the division of sanitary engineering, Massachusetts Department of Public Health.

In the same issue, preplanning for water supply emergencies is urged by Ralph M. Soule, sanitary engineer. Advance actions suggested by Soule on the basis of Massachusetts experience include having emergency chlorinating equipment and a supply of chlorine compounds on hand, provision for an auxiliary gasoline or diesel engine to drive electrically operated pumping equipment, protection of pumping stations from flooding with polluted waters, and organization and training of auxiliary personnel.

“ ”

A 5-day smog brought death to at least 300 residents of London last December, reported Dr. John Scott, medical officer, County of London. Most died from respiratory disease, including bronchitis.

The new dental clinic of the Philadelphia General Hospital was dedicated on October 14, 1959, equipped with 21 dental chairs, 10 dental units, a dental research laboratory, closed-circuit television, and an intercommunication system. The clinic is completely air conditioned.

Dr. Robert H. Ivy, who in 1901 served at the hospital as the first dental intern in America, was presented with a plaque at the dedication ceremonies.

“ ”

Researchers engaged in the study of cybernetics applied to medicine and biology may now join the recently founded International Society of Cybernetic Medicine, which has offices at 318 Via Roma, Naples, Italy. Physicists, biologists, engineers, physicists, and mathematicians are eligible.

“ ”

Observing that a number of college students, lined up for immunization shots, fainted under the needle, Dr. Joseph Smith, health officer in Providence, R.I., relates that he once marked a circle on the floor and painted instructions in large letters, FAINT HERE. After that, no more students fainted.

“ ”

Forty-nine medical and nursing officers and other specialists are on assignment from the Public Health Service heart disease control program to 27 State and local health departments to help extend and stimulate work in cardiovascular disease control throughout the United States. The total number of these assignments is expected to increase appreciably in 1960.

More men, women, and children are killed by reckless walking than by reckless driving in the District of Columbia, according to a 10-year survey by the American Automobile Association, which established that two-thirds of all deaths from traffic on D.C. streets were pedestrians.

“ ”

Farm labor camp operators in New York State must meet stricter requirements in order to obtain operating permits this year. New provisions added to the State sanitary code have strengthened specific requirements in regard to space, fire hazards, bathing facilities, heating facilities, screening, and maintenance of buildings and grounds. Approximately 40,000 migrants work in the State's 1,100 farm labor camps each year.

“ ”

The first recognized case in Brooklyn of rabies in a bat has been reported by Dr. Morris Greenberg, director of the New York City health department's bureau of preventable diseases. Since 1953 the Public Health Service has received reports of 75 persons bitten by rabid bats; all but three bites occurred when a bat was picked up.

“ ”

Radiation is the most important newly emerging public health factor in the United States today, a nationwide panel of Federal, State, and local public health directors told the American Public Health Association.

Air pollution, aging, chronic disease, mental health, safety, urban and suburban expansion, financial management, staphylococcal infections, and medical and surgical care of the indigent, followed radiation closely in the panel's listing.

A series of surveys is planned by APHA to identify changing trends as a basis for improved planning in public health. A panel of 80 has been established for the survey series which includes 52 State and Territorial health commissioners, 20 directors of city or county health departments, and 8 regional directors of the Public Health Service. Each will be queried periodically on trends in his own jurisdiction.

Industrial Hygiene for the Farm

by Mail Order

CLYDE M. BERRY, Ph.D

WHEN A FARMER tries to unclog the mechanical cornpicker, does he realize the danger of keeping the power on? When he enters the silo, does he know what to do to protect himself against lethal gas? Does he know how to handle safely toxic chemicals used on the farm?

Modern farming meets a growing number of hazards. How can health agencies provide the farm with the industrial hygiene services now used in other occupations?

Up to this point, the large farm population at risk has derived little benefit from the Nation's experience and skills in industrial hygiene, partly because these services have developed along custom-tailored, high-quality lines. We shrink from suggesting to the farmer a "do it yourself" program.

Nevertheless, goods and services must flow from the producer and purveyor to the consumer. A method of extending the consumption of industrial hygiene services through a mail-order technique may merit consideration. An analysis of the problems involved in such an approach indicates that it may be possible for farm application.

In an industrial setting, we in industrial hygiene have believed that only limited delegation of responsibility to nonprofessional people can

be made and a performance level be retained that meets our exacting achievement criteria. Sacred has been the conviction that there is no substitute for knowledge, skill, and experience in setting up a sampling regimen, supervising data compilation, interpreting findings, and recommending controls.

The above are valid arguments. The dollar cost of mistakes can be considerable. Injury to health, proximate and ultimate, is a potential that continually haunts us. Resurveys may need to be made. Modification of engineering controls may be required. These are expensive. The individual responsible for a mistake can lose the support of his employer and be discredited by his confreres. This is sobering to the professionally courageous and frightening to the professionally timid.

Almost all of our efforts are unique. Individual problems are exactly that—and must be so studied and controlled. With such an approach it is entirely understandable that problem solving and routine program commitments represent the major part of established programs. With limited staff it is natural to try to do the most in the least amount of time for the greatest number of people.

This situation provides a logical explanation for finding the best industrial hygiene coverage in the larger plants and in those industries with the most acute hazards. In the larger plant, operations are likely to be more continuous. Job assignments are likely to be more specialized. Presenting the findings of studies to management and getting controls initiated is

Dr. Berry, who is associate director of the Institute of Agricultural Medicine of the State University of Iowa, Iowa City, delivered this paper in substantially the same form at the 1959 meeting of the American Conference of Governmental Industrial Hygienists.

ECHOES from Public Health Reports

THE PATCH TEST IN CONTACT DERMATITIS¹

By LOUIS SCHWARTZ, *Medical Director*, and SAMUEL M. PECK, *Senior Surgeon (R)*,
United States Public Health Service

The patch test was devised by Jadassohn (1) almost 50 years ago for demonstrating the causes of contact dermatitis. In the United States the test was not widely used in industry, nor was its practical value appreciated until attention was called to the prevalence of occupational dermatitis and the chemicals causing it, and to the value of the patch test in differentiating between occupational and other sources of contact dermatitis.

The test was first used as a means of determining the actual causative irritant in cases of contact dermatitis. Since dermatitis has on many occasions been found to be caused by irritant chemicals contained in wearing apparel and cosmetics, manufacturers have taken advantage of the patch test to determine the possible skin-irritating or sensitizing properties of new products before placing them on sale to the public.

Some enthusiasts have even proposed the inclusion of the patch test as part of the pre-employment examination with the idea of weeding out those workers who might develop occupational dermatitis. The fallacy of this proposal lies in the fact that most workers develop occupational dermatitis by contact with a primary irritant or by acquiring an allergy while actually employed. Pre-employment patch testing, therefore, could not weed out those who would become sensitized,

It is now universally accepted that the patch test, if properly performed and interpreted, is a valuable diagnostic procedure. Its value in preventing possible outbreaks of dermatitis from the use of

APRIL 28, 1944, pp. 516-557

Dr. Louis Schwartz and Dr. Samuel M. Peck introduced the "prophetic" patch test for determining whether certain substances will produce contact dermatitis. The test is applicable to new chemicals used in manufacturing as distinct from a previous patch test which had been developed for diagnosing the cause of existing dermatitis.

• Offer reassurance that special problems can be met through mail consultation, telephone, or (under unusual circumstances) by a personal visit from a professional.

• Make provision for services such as alterations, return-for-refund, and trade-in.

• Suggest financing methods, tax credits, amortization rates, and relationships to any legal liabilities which might be involved.

• Keep performance claims conservative. This implies building in an extra margin of safety.

Our problem can be compared roughly to that of merchandising in rural areas soon after the wide expanses of America were opened up to homesteading. Railroads and stagecoaches provided the link between villages and towns. Special needs of consumers were met by making articles on the premises. Where special skills were required, as in blacksmithing and leathercraft, artisans set up shop. For regularly used items that could be mass-produced in the industrial east there was the outlet of the general store. The general store, however, was limited in the stock it could carry as to kind, size, color, material, or other features. The distance between farm and village was considerable and trips were infrequent. A government service to the individual farm or ranch provided an answer. Rural free delivery of mail made the mail-order house possible, and the combination resulted in an effective approach that may have merit in an analogous manner for the current professional dilemma which we face.

We shall need to curb our natural response—that this cannot be adapted to industrial hygiene—and approach it with an open mind. Perhaps it can be applied to industrial hygiene, if we try.

Remember, we are directing our efforts toward the mass markets, not the carriage trade. We seek to capture the industrial hygiene build-it-from-a-kit group. What changes are in order for us to provide mail-order industrial hygiene for the farm? At the risk of losing my membership in our professional societies, I would like to present the following arguments for considering such an approach.

Farmers are not being reached. Until small plant needs have been met farmers will still be

professionally neglected. They have a problem. How can we justify any delay in providing them with a needed service, however meager?

We will do more good than harm. Those instances where untoward results from faulty choice of equipment, improper maintenance, a false sense of security, and other factors will be outweighed by acceptable control procedures.

Under certain circumstances sacrificing quality for quantity can be justified. Why can't we adapt the "weighted exposure" concept to the situation? Wouldn't a little industrial hygiene for a lot of people be as justifiable as intensive service for a few?

The Catalog

Let us assume that the arguments above have been cogent and convincing. How can we make industrial hygiene for the farm by mail order work? The following methodology is offered as the first halting step in this direction.

Concentrate first on a "catalog." Prepare material that will be most amenable to a do-it-yourself approach, for hazards that have the most serious potentials, and for the largest number of farmers.

Get the catalog into the hands of the farmer. Many avenues are available: direct mail; distribution by farm children, rural organizations, or farm extension personnel; over-the-counter from farm equipment outlets or hardware stores; or on a request basis, with the demand built up by blanketing farm communication media—magazines, newspapers, radio, and television.

Concentrate heavily on timing and lucidity. The farmer has seasonal problems. Anticipate these so he can avoid emergencies and inevitable improvisations. The material should be so presented that he can see it applies to him and his operations.

Aim for standardization. "packaged" control. Inevitably this will lead back to the manufacturer, the packager, and to sales and service outlets for farm needs. It is a laudable objective in the area of farm operations. Specifications should take precedence over the traditional faith in brand name with the added information on make and model.

easier if management had been faced with repeated situations of a comparable nature and is "educated" to work with industrial hygiene people.

Providing industrial hygiene services for the small plant is not easy. We swim yearly through a sea of salty tears as we deplore this lack of services and fervently discuss ways and means of providing these needed services. We concede that the plants are widely scattered and travel time is considerable. The few people employed have multiple duties. Other parameters include variations in processing, transient personnel, poor plant maintenance, lack of medical supervision, inadequate housekeeping, hand-to-mouth financing, lack of mechanization, and absence of records.

Providing industrial hygiene services to the farm is a somewhat similar but even more difficult problem. The additional parameters include a most geographically diffuse population at risk; the home and the workplace are the same; management and labor are identical; the worker may be of either sex and will range widely in age, intelligence, education, normal health status, and training for a specific job.

Further complications are that the jobs may be highly intermittent; may be performed indoors or outdoors; and may be heavily influenced by the weather and climate. They are subject to considerable variation in personal hygiene and in the availability and use of personal protective equipment. There is no separate maintenance man or operator. The farmer is both.

How can an industrial hygiene service that will meet the exacting criteria we have established be provided to a one-family operation? I have grave personal misgivings that this can ever be achieved. If we have not been able to meet the needs of the small plant, how can we meet the needs of the farmer? Will there be enough money? Enough people? Can the problems which we described be circumvented?

It seems unlikely that there will be enough money and people to do the kind of job that we have held to be acceptable by our professional standards. Our choice, then, is one of necessity. We can perform individual, high-quality industrial hygiene services and be of little help to the great mass of those who need help. The

alternative is heresy: to sacrifice quality for quantity.

Let us frankly consider how such wide coverage might be provided:

Can a system be devised for enabling the farmer to identify his problem?

If there are unusual aspects to the problem, a nonstandard situation, can it still be identified? Can a farmer describe his problem in nontechnical terms?

Can the system provide for the expert but remote appraisal of nonstandard conditions? Can control suggestions be provided to the farmer in nontechnical terms—not only so he can understand them, but so that he cannot misunderstand them?

If professional heresy can be hypothetically condoned for the moment, then one can speculate further as to how these problems of the farmer can be handled from a distance. Let us suppose that it is possible to place in the hands of the farmer a device for visual association that can assist him in identifying problem areas, real and potential, known and unknown. The device would:

- Apply specifically to individual farm equipment items and operations, or either, that are used or performed by the particular farmer to whom the device is provided.
- Be sufficiently specific so that alternative control approaches are definable by the farmer as to first cost, cost of operation, service factor, and degree of probable effectiveness.
- Provide enough option in listings of size, mounting, power source, and materials of fabrication for a fairly wide range of needs, and discuss farm-use variables such as severity and duration of exposure, weather conditions, and equipment breakdown.
- List sufficient detail for satisfactory ordering, shipping, installing, and testing.
- Indicate in advance what will be involved in maintenance, storage, multiple application, power consumption, and provide a listing of depots where expendable items and repair parts may be secured.
- Emphasize comparison and choice (management prerogatives).
- Minimize coercive overtones.
- Point out profit incentives as far as possible.

Children with rheumatic fever or heart disease are given a wide range of educational services, a national survey discloses. Methods to provide these essential services in all urban areas are recommended.

Educational Services for Urban Children With Rheumatic Fever or Heart Disease

HELEN M. WALLACE, M.D.

CHILDREN with rheumatic fever or heart disease, either rheumatic or congenital in origin, were one of the first groups for whom special educational provisions were made by departments of education. These special educational provisions, over and above regular classes in regular schools, included teaching in special classes, special day schools, special residential schools, hospitals and convalescent homes, and in the child's home. Evidence of a consistent decline in the incidence and prevalence of rheumatic fever and rheumatic heart disease in children and youth is accumulating (1). Because of this obvious trend, it seems timely to look at the special provisions made for children with rheumatic fever or heart disease by public school systems in the larger cities of our country.

Method of Study

During the winter of 1958, a questionnaire was sent to the health officers and superintendents of schools of each of the 106 cities in the United States having a population of 100,000 or more according to the 1950 census. It con-

tained questions regarding the types and numbers of handicapped children cared for in the public school system; age of admission; type of school facilities; presence of established criteria for special educational placement and the agency responsible for their establishment; method of reviewing applications for special educational placement, personnel engaged in such review, and frequency of review; organization of special education within the public school system; method of financing and costs of education of handicapped children; and the provisions made for transportation and attendant service during transportation of handicapped children to and from school.

According to the 1950 census, the 106 cities had a combined total population of 44,311,716, or 29.4 percent of the total U.S. population, and a combined school enrollment of children aged 5 through 17 years of 7,192,100, or 28.4 percent of the total U.S. population. Ninety-eight of the 106 cities, or 92 percent, responded. These 98 respondent cities had a combined total population of 41,686,921, or 94 percent, and a combined school enrollment of children aged 5 through 17 years of 6,849,105, or 95 percent. All but 9 of the 98 respondent urban communities provide some special school services for children who have rheumatic fever or heart disease.

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If all automatic silo unloaders were reinstalled at the time the silo is filled, a built-in device would be available for eliminating exposure to silo gas. The catalog might give the following instructions for ordering a spiral, wire-reinforced, flexible, cloth duct to fit the fan discharge of a silo unloader:

Diameter. Measure outside diameter between two pieces of wood held parallel to each other as shown in figure 1. This is the inside diameter of the tube. Order next larger size.

Length. Allow for settling of 15 percent of height of silo. Calculate in feet. Add distance (in feet) from center of silo to inside wall. This is the length to be ordered.

Installation. Remove blower chute; place tube over circular fan discharge opening and clamp as shown in figure 2. Attach wall hanger as shown in figure 3. Fasten to wall at window or farthest point from any nearby building.

Operation. Make visual observation from the ground that discharge end of tube is in place. Operate unloader for 15 minutes before entering silo.

Note: To avoid removing silage, support unloader above silage as shown in figure 4. The support should be 4-6 inches thick and approximately 24 inches in diameter.

Summary

Justification has been attempted for departing from high-quality, custom-type industrial hygiene services in order to serve a geographically diffuse population at risk. The method proposed for such a group involves many of the techniques of merchandising by mail. General suggestions for applying such a service to agricultural operations are made.

Observance Date for Child Health Day Changed

Child Health Day will be observed on the first Monday in October beginning with 1960, instead of on the traditional May 1. The change, effected through joint congressional resolution, permits the United States to link observance of that day with Universal Children's Day, which many nations observe on the October date.

Since 1956, by agreement between the United States and the United Nations, the Child Health Day proclamation has contained references to Universal Children's Day and to the work of the United Nations and the United Nations Children's Fund.

Child Health Day has been observed on May 1 every year since 1928. Since 1935, the Children's Bureau, as requested by the Association of State and Territorial Health

Officers, has sponsored appropriate Federal activities.

States and communities frequently use the day to call attention to a particular condition affecting children or to enlist community support in improving the health of children. For example, the day was once used to initiate a campaign for immunization against diphtheria and smallpox. It has also been used to emphasize the values of birth registration, community planning, prevention of home accidents, and medical and dental examinations for children entering school for the first time.

The theme of "Child Health" in 1960 is expected to reflect the significant findings of the 1960 White House Conference on Children and Youth.

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Previous papers reported on the general information obtained from the questionnaires regarding all types of handicapped children and children with orthopedic, neuromuscular, or neurological conditions (2,3).

This paper summarizes the information obtained regarding children with rheumatic fever or heart disease.

Educational Placement Available

The most common types of educational placement for children with rheumatic fever or heart disease, other than regular class in a regular school, are home instruction, special day class, combination of home instruction and special day class, and special day school (table 1).

It is of some interest that 45 communities provide placement by home instruction, 29 in a special day class, 22 in classes in a hospital or convalescent home, 17 in a special day school, and 1 in a special residential school.

Table 1. Public school educational placement, by type other than regular classes in regular schools, of children with rheumatic fever or heart disease

Type of placement	Number of school systems
Home instruction only	19
Special day class only	8
Special day class and home instruction	6
Special day school only	6
Special day class, home instruction, hospital or convalescent home	5
Special day school, home instruction, hospital or convalescent home	5
Special day class, special day school, home instruction, hospital or convalescent home	3
Special day class, special residential school, home instruction	3
Home instruction, hospital or convalescent home	3
Hospital or convalescent home only	3
Special day class, hospital or convalescent home	1
Special day class, special day school	1
Special day class, special day school, hospital or convalescent home	1
Special day class, home instruction, special residential school	1
Special day school, hospital or convalescent home	1
Uncared for or not reported	32
Total	98

Table 2. Number of children with rheumatic fever or heart disease reported by school systems

Type of placement	Number of children	Number of school systems	
		Providing service	Reporting number of children
Regular class	1,065	98	11
Home instruction	755	15	41
Special day school	593	17	17
Special day class	181	29	24
Hospital or convalescent home	210	22	19
Special residential school	67	1	2

Some communities provide just one type of special placement: 19 by home instruction, 8 in a special day class, 6 in a special day school, and 3 in a hospital or convalescent home.

Officials were asked to report the number of known children with rheumatic fever or heart disease in the various types of educational placement. This question was incompletely answered on the questionnaires. There was more complete reporting of the number of children in hospital and convalescent homes, special day classes, special day schools, and receiving home instruction than of children in regular classes or in special residential schools. The largest single group of children reported was in regular classes, followed by home instruction, special day schools, and special day classes in that order. Only a few children were reported to be in special residential schools. Undoubtedly there was considerable under-reporting of children in regular classes (table 2).

Educational Placement Method

Ninety-one of the ninety-eight reporting public school systems, or 93 percent, stated that they had established criteria for the educational placement of all types of handicapped children. One each had established criteria only for cerebral palsy, for the blind, and for mental retardation. Four did not answer this question.

In almost one-half of the public school systems, responsibility for establishing criteria for

educational placement has been assumed by the local government, predominantly the local board of education. In slightly more than one-quarter, the responsibility has been assumed by the State government, predominantly the State department of education. The participation of the health department, either local or State, is very small. When the individual disciplines are listed under local government, there is medical participation in less than one-half of the methods.

In one-half of the public school systems, the board of education alone reviews applications for special educational placement. In no instance is such review done by the department of health alone. In approximately one-fifth of the school systems the review is carried on jointly by the departments of education and health. In only three school systems was the recommendation of the practicing physician acted upon without any agency review.

The number of professional personnel reviewing applications for educational placement ranged from 1 in one school system to 12 in another. The most frequent number of participants was 6 in 18 school systems. In all but two of the school systems, more than one professional person is responsible for the review of applications.

The type of professional person participat-

ing in the review of applications is of the utmost importance. - The psychologist and the school administrator participate most frequently, 87 school systems reporting the use of these professions. The nurse and the teacher participate as reviewers in about one-half of the school systems, the social worker and the school counselor in about one-third. There is limited participation by such personnel as the director of special education and the vocational counselor.

In all school systems except 14, there was some type of medical participation in review of applications. It is surprising to find infrequent participation by certain medical specialists, especially the cardiologist and the pediatrician.

It is considered essential that there be a careful review of all handicapped children, not only prior to educational placement but also periodically during such placement and prior to withdrawal from such placement. The questionnaire asked for information on all three aspects. Ninety-six percent of the school systems indicated that they review all applications prior to placement, 85 percent do so periodically during placement, and 70 percent prior to withdrawal from placement. Inquiry was also made regarding the frequency of periodic review of the children during placement. At

Table 3. Frequency of review of all types of handicapped children during placement

Frequency of review	Regular class	Special day classes	Special day school	Special residential school	Home instruction	Hospital or convalescent home
Once a week				1	1	
Once a month				1	2	
Once every 6 weeks					1	
Once every 2 months		1				
Once every 3 months		1			1	1
Once every 4 months			1			
Twice a year	6	9	9		8	6
Once a year	25	33	20	7	25	10
Once every 2 years	2	7	1			1
Once every 2-3 years		2	1		1	
Once every 3 years	1	2	2			
As recommended by family physician					3	6
Left to staff of institution						2
No definite plan	18	18	11	9	14	15
Frequency not stated	1	2			3	
Prior to return to school					1	
Not done at all					2	
No information or not applicable	45	23	53	80	36	57
Total	98	98	98	98	98	98

least once a year, 45 percent of the school systems review children in special day classes, 39 percent review children on home instruction, 32 percent review children in regular class, 31 percent review children in special day school, 17 percent review children in special hospitals and convalescent homes, and 9 percent review children in special residential schools. The stated range of frequency of review varied from once a week (in one special residential school and on home instruction) to a complete lack of review for children on home instruction in two school systems (table 3).

Because it is recognized that "paper review" of children may not provide as complete a picture of the child, his progress, and his needs as a personal visit with the child and his family, the questionnaire asked if a team of personnel, either from the board of education or the department of health, sees and evaluates all handicapped children personally. Thirty-eight percent of the communities provide such a team, 35 percent do not, and 27 percent did not answer this question. The number of persons employed on a team basis for evaluation of the rheumatic fever or cardiac group vary from one person in about 10 percent of the communities to six persons in two communities. The majority of the communities provide a team of from one to three people as shown below.

<i>Number of personnel</i>	<i>Number of school systems</i>
One	9
Two	12
Three	8
Four	0
Five	1
Six	2
Team	1
Clinic	4

A psychologist and a physician (whose type was not stated) were most frequently on a team. Other personnel used with some degree of frequency were the teacher and the nurse. Community facilities were used rarely, and personnel such as social workers, school counselors, school physicians, and certain medical specialists (pediatrician and cardiologist) were used relatively infrequently. Another surprising finding was that a crippled children's clinic was reported as being used in only

two instances. In three communities, there was team evaluation of children with rheumatic fever or heart disease without any medical participation on the team. The type of personnel engaged in team review and the number of school systems reporting are shown below. Replies were received from 37 cities, 28 indicating that more than one person is used for evaluation.

<i>Type of personnel</i>	<i>Number of school systems</i>
Psychologist	11
Teacher	7
Administrator	5
Nurse	5
Therapist (type unspecified)	2
Director of special education	2
Counselor	2
Physical therapist	1
Social worker	1
Occupational therapist	1
Speech therapist	1
Medical:	
Type not specified	15
Cardiologist	4
School physician	3
Pediatrician	2
Medical director	1
Health department physician	1
Community facility used:	
Crippled children's clinic	2
Child physician	1
Consulting clinic	1
Diagnostic team	1

In approximately two-thirds of the public school systems, there is a department of special education with its own director. In approximately one-fifth of the public school systems, special education is a part of another department of the school system.

Of the 98 communities reporting, 50, or 51.1 percent, provide children with rheumatic fever or heart disease transportation to and from school, and 48, or 48.9 percent, do not. Sixteen communities provide attendant service during transportation, or 16.3 percent of the school systems reporting and 32 percent of the school systems providing transportation. In other words, 83.7 percent of the school systems reporting do not provide attendant service during transportation for this group of children, and 68.0 percent of school systems providing transpor-

tation for these children do not also provide attendant service.

Discussion

The foregoing data may be summarized as follows:

- All but 9 percent of the urban public school systems provide some school services for children who have rheumatic fever or heart disease.
- Educational placement of children with rheumatic fever or heart disease, other than regular class in regular school, is most frequently home instruction or special day class, or a combination of these.
- About one-half of the school systems provide placement by home instruction, one-quarter in a special day class, one-fifth in a hospital or convalescent home.
- Thirty-six communities, or 36 percent, provide just one type of educational placement.
- Most of the children are in regular class, with smaller numbers in home instruction, special day school, or special day class.
- In one-half of the communities, criteria for special educational placement have been established by the local board of education, with little participation of the local or State health department.
- In one-half of the communities, all applications for educational placement are reviewed separately by the board of education, and in one-fifth, this review is maintained jointly by the board of education and the department of health.
- In most school systems, applications for special educational placement are reviewed by more than one person, the most frequent disciplines being psychology and school administration. Although there is usually some medical participation, it is rarely a pediatrician or cardiologist.
- Most children are reviewed prior to placement, 85 percent are reviewed periodically during placement (although the frequency varies considerably), and 70 percent are reviewed prior to withdrawal from placement.
- About one-third of the communities provide for team evaluation of children with rheumatic fever or heart disease. The team is usually composed of one to three people, most fre-

quently a psychologist and a physician; infrequently, a cardiologist.

• One-half of the communities transport this group of children to school and one-third of the communities which supply transportation also give attendant service.

Thus the quantitative information indicates that there is less variety of special educational services for children with rheumatic fever or heart disease in most urban communities than for children who are orthopedically handicapped (3), and therefore less flexibility for them. But what of the qualitative information?

A study of 74 eighth grade children in special cardiac classes in one community in 1951 (4,5) indicated that 3 (4 percent) had no heart disease; 21 (28 percent) had possible and potential heart disease (patients in whom the symptoms or signs, though suggestive of heart disease, did not justify a definite diagnosis and from whom a history of an etiological factor which might cause heart disease was obtained); and 50 children (68 percent) had organic heart disease. Of the 50 children with organic heart disease, 37 had rheumatic and 13 had congenital heart disease. Two required no limitation of physical activity, and 39 were permitted to engage in all physical activities except violent competitive sports. Thus, 41 children with organic heart disease, 3 non-cardiacs, and 21 with possible and potential heart disease (a total of 87.9 percent) probably did not require placement in special classes on the basis of medical criteria. Of the remaining nine children with organic heart disease, significant restriction was indicated. Included in the nine were two children with tetralogy of Fallot, one with interventricular septal defect, three with rheumatic heart disease with marked cardiac enlargement, and three with organic disease who had active rheumatic fever less than 1 year prior to the examination.

A subsequent smaller study conducted in 1952 by the New York City Department of Health on all 19 children in two cardiac classes in an elementary school found 6 children (32 percent) were over-restricted, 1 was restricted insufficiently, and 12 children (63 percent) were appropriately placed. Of the 19 children, 13 had

rheumatic heart disease, 5 had congenital heart disease, and 1 had no heart disease.

An evaluation of 10 homebound cardiac children by a team composed of a pediatric cardiologist, a public health nurse, and a medical social worker found 6 children with heart disease (4 severe, 2 mild), 3 children with potential heart disease (history of rheumatic fever but no heart disease), and 1 child, a non-cardiac (6). Of the 10 children, 3 had rheumatic fever, 1 had congenital heart disease, 5 had rheumatic heart disease, and 1 was non-cardiac. Eight of the ten families visited needed public health nursing service, interpretation of illness, anticipation of developmental and emotional problems, and specific dietary and postural advice. Seven of the ten families needed casework service because of the length of time the children were homebound rather than the fact of the illness itself. Most families expressed an additional need for planned recreational programs for the cardiac homebound who is not confined to bed. There was also a need for vocational assistance among the adolescent children.

There is evidence to indicate that in some instances there may be erroneous information regarding the child's diagnosis; there may be inappropriate placement of the child, mostly in the direction of overplacement; and there may be over-restriction of a child's activities.

Recommendations

On the basis of these findings, certain specific recommendations may be made:

1. That each urban community have a range of special educational services for school children with rheumatic fever or heart disease, including special day class, home instruction, and teaching in a hospital or convalescent home.

2. That the local board of education and department of health jointly, with the assistance of professional experts from the various disciplines concerned (pediatrics, cardiology, education, public health nursing, social work, and vocational counseling), establish criteria for the special educational placement of these children.

3. That all applications for the placement of these children be reviewed by a team composed

of the various disciplines listed in the second recommendation prior to placement, periodically during placement (preferably every 3 months), and prior to withdrawal from special placement. Furthermore, it is recommended that children who are in regular classes and have had rheumatic fever or have heart disease be followed carefully. Whenever there is any question, the team should see the child and his family personally rather than rely upon "paper" information only.

4. Because of the need, children with rheumatic fever or heart disease who receive home instruction or are in a special day class or school should be considered a high priority group for public health nursing service.

5. Because of the difficulties of diagnosis, each large urban area should have at least one diagnostic and consultation service for children with rheumatic fever or heart disease to which practicing physicians, school health services, and well child conferences may refer these children for a diagnostic workup. This service might be provided by the local health department, the official crippled children's agency, a local hospital, or the school health service itself.

6. Because of the well-known value of prophylaxis against recurrences of rheumatic fever, it is recommended that school health service personnel periodically (preferably every 3 months) review the current status of each child with a verified history of rheumatic fever. When such a child is not on prophylaxis, school health service personnel should discuss this procedure both with the child's physician and the family.

7. Because of the rapid advances in diagnostic and surgical techniques any child who gives evidence of congenital heart disease and who has not been given an adequate diagnostic workup should be referred for this service.

8. Placement of children in other than regular classes in regular schools should be made only after it is clear that the child cannot possibly fit into this normal setting.

9. Recorded data with adequate information on the continuity of care from the treatment agent or agency is essential, if there is to be a clear picture of the child's course.

10. Wherever possible, the educational setting should be modified to fit the child rather than attempting to place the child in a setting which may be inappropriate.

Summary

Data on children with rheumatic fever or heart disease are extracted from findings of a national survey conducted in 1958 to ascertain the status of school services for all handicapped children in cities having a population of 100,000 or more. Wide variation exists in the range of services, policies, and personnel concerned. Recommendations are made to assure these children the benefit of essential services in all urban areas.

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The Yearbook of Agriculture, 1959

In the publication, "Food—Yearbook of Agriculture 1959," the U.S. Department of Agriculture presents 66 articles which represent a comprehensive range of approaches to the subject of food. Contributed by authorities in their respective fields, the articles are grouped under headings such as "The Nutrients," "Health," "Quality," "Preparation," "Costs," and "Trends."

For men, the editor, Alfred Stefferud, recommends articles such as "Nutritional Needs After 25," "What Your Food Money Buys," and "Feeding 6,280 Million." Titles of special interest to parents and teachers include "The Story of Nutrition," "A Table of Food Values," and "Habits—and More." Farmers are directed to "Quality in Animal Products," "Marketing, Quality, and Cost," and "Conserving Nutritive Values."

Also featured are "Adolescents and Young Adults," "Youth Learns About Food," and "Trends in Heights and Weights."

There are 736 pages, liberally illustrated with drawings, charts, and graphs, in the yearbook, the latest in the series of annual volumes that have been printed for 110 years.



Nutrition studies with human beings supplement research with laboratory animals. This group of young women and other such groups serve as volunteer squads to help nutrition researchers find out more about the relation of food to health. Under careful supervision the diet squad follows a rigidly controlled diet for many weeks. A variety of detailed analyses show how the body uses certain nutrients, whether the diet supplies enough of each, and how the nutrients depend upon each other in metabolism. Such studies of men and women of different ages are being carried out in laboratories throughout the country.



American Nurse in Moscow

"Are American policemen trained to deliver babies on the streets because American mothers can't afford to pay for the doctor?"

"Isn't it true that in America if a person has an acute attack of appendicitis and doesn't have the money on him to pay beforehand for the operation, he just has to die?"

"Why is it that in America if a worker has an industrial accident he is thrown out of the plant for good?"

Mrs. Rose G. Ernsberger, a Russian-speaking nurse officer of the Public Health Service, spent her summer answering these and similar questions on American public health practices at the American National Exhibition in Moscow. The exhibition enjoyed a daily attendance of some 60,000 Russians, of whom hundreds flocked to the public health exhibit to see and hear about medicine in the United States.

From 11 a.m. to 9:30 p.m. 7 days a week, Mrs. Ernsberger was subjected to a bewildering array of questions about American treatment of cancer, heart disease, hypertension, bronchial asthma, tuberculosis, stomach ulcers, and almost every other illness.

Each day, as soon as she stepped up to her lecture stand under the exhibition's geodesic dome and plugged in her microphone, a crowd gathered. "At first they were rather shy and stayed back from the platform as if they didn't know what to say. Then someone would gather his courage, rush up to the stand, and demand to know 'how do you treat such-and-such?' This signal would break the ice, and others would crowd around," according to the nurse.

"They wanted to know if we permit abortions, how we cure sterility, and what sort of aid we give to expectant mothers. The last question is especially important to Soviet workers, because mothers there have to work in

order to bring the family income up to some reasonable level. It was quite a revelation to them to hear from me that, although we do have annual sick leave, pregnancy allowances, and other benefits, we don't have any well-defined national system for pregnancy care because we Americans generally feel that mothers should stay home and take care of their children.

"Another question concerned day nurseries. Working mothers in the Soviet Union leave their children in such nurseries, which are common throughout the country. They wanted to know why we do not have many such nurseries. The answer was that our mothers take care of their own children. They seemed to understand that."

The Russians have been taught to believe that there is no free medical care in the United States and that good medical care in general is too expensive for the average working family to afford. Mrs. Ernsberger told them: "There are 26 million families in the United States with hospitalization insurance. Free medical care is given by Government hospitals, private clinics, and a variety of other public and private institutions. The decision whether a patient pays or not is made by public health nurses and social workers. Anybody in the United States can get medical care, whether he can pay for it or not."

Most of the Russian visitors to the exhibition believed the answers, but almost every group around her contained one or two hecklers. If they loudly expressed doubt, Mrs. Ernsberger would say, "I've been a nurse in America for 30 years and a public health nurse for 18. If you don't believe me, this doesn't hurt us Americans at all, because we still get the same splendid services. I know, because I live there."

National Hospital Insurance in Canada

FRANCIS d'A. COLLINGS, M.A.

JULY 1, 1959, marked the first anniversary of national hospital insurance in Canada. It is too early yet to evaluate the new Canadian program in terms of experience, since only half of the 10 Provinces have participated for the full year, and data on costs, utilization, and other matters of interest are not yet available. It is an appropriate time, however, to survey some structural details of the new program. With respect to the financing of hospital care, as in many other areas, Canada has evolved what is essentially a middle way between American and British practice. The hospital insurance system now emerging in Canada is sufficiently different from our own—and in a general social, economic, and political setting sufficiently similar—to merit close interest in the United States.

The background of the Canadian hospital insurance program and the history of events that led up to it have been adequately described elsewhere (1,2). This report will sketch briefly the outlines of the national program, and then describe in greater detail some aspects which may be of particular interest to those concerned with health and medical care planning in this country. The report is based partly on published material, partly on conversations with officials of the Department of National Health and Welfare in Ottawa and other persons in the Canadian health field.

The Federal Act

The Hospital Insurance and Diagnostic Services Act, authorizing "contributions by Canada in respect of programmes administered by the Provinces providing hospital insurance and laboratory and other services in aid of

diagnosis" (3), was enacted by unanimous vote of the Canadian Parliament more than 2 years ago. Its effectuation was delayed by a requirement that a majority of the 10 Provinces, having among them at least 50 percent of Canada's total population, be ready to participate. This requirement was eventually deleted, and the program commenced on July 1, 1958. The deletion was made in order to get the program started without waiting for Ontario. This province, with almost one-third of Canada's population, was by then fully committed, although its plan was not due to start until January 1959.

The act provides for a Federal contribution of approximately 50 percent of the costs of Provincial hospital insurance plans. The plans must provide certain benefits and meet certain conditions laid down in the act, but otherwise are entirely Provincial responsibilities. Details of participating plans are drawn up in written contractual agreements between Federal and Provincial governments, an arrangement constitutionally in accord with the British North American Act of 1867 (Canada's written constitution), which makes health and welfare specifically a Provincial responsibility.

Inpatient hospital benefits that must be provided by participating Provincial plans include:

- Ward-level accommodation and meals for as long as the physician considers them medically necessary.
- Necessary nursing services.

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- Diagnostic procedures together with necessary interpretations, including laboratory and radiological tests (but excluding clinical procedures related to diagnosis, which are considered medical rather than hospital services).

- Operating room, case room, anesthetic facilities, and such items as routine surgical supplies.

- Drugs, biologicals, and related preparations used in the hospital, as prescribed by the physician.

- Radiotherapy and physiotherapy where available.

- Services of salaried hospital personnel, excluding physicians giving medical and surgical care to individual patients, but including services provided by interns, residents, medical administrators, physiotherapists, radiotherapy technicians, occupational therapists, and social workers employed by the hospital.

Optional services which the Province may include as part of its hospital plan are:

- Rehabilitation and cancer programs.

- All or some of the above inpatient services on an outpatient basis.

An important condition for Provincial participation is that all these benefits, required or optional, must be available to all residents of the Province upon "uniform terms and conditions" (3), without restrictions, for example, as to age or income. This does not necessarily mean that coverage must be compulsory for all residents, although in fact most Provinces have chosen to make it so. Residency in the Province is defined to apply to everyone who makes a home there, including U.S. citizens, "new Canadians" (new immigrants), and other foreign citizens. Tourists and transients are excluded.

It must be stressed that these benefits cover only basic hospital care, and do not cover medical and surgical services provided in hospitals by physicians (including anesthetists), except insofar as provided by salaried hospital personnel, as mentioned earlier. If the patient wants accommodation above that provided at the basic level, for example, a private room, he must pay the extra cost. Mental and tuberculosis hospitals do not come under the program, nor do nursing homes, although patients in these institutions are eligible for transfer

to general hospitals for insured hospital care if deemed medically necessary.

The Federal Contribution

The act, as well as specifying minimum requirements of participating Provincial plans, sets out the formula which determines the Federal share of the cost of the Provincial plan. This formula is related to hospital costs in the Provinces rather than to fiscal capacity or need.

The Federal contribution to the cost of each Provincial plan is 25 percent of the per capita cost of inpatient services in the Province plus 25 percent of the per capita cost of inpatient services in Canada as a whole, multiplied in each case by the average number of insured persons. The Federal contribution to all Provincial plans is thus approximately 50 percent of cost, although for individual Provinces it will vary from about 45 percent in high-cost Provinces such as Ontario to about 72 percent in low-cost Provinces such as Newfoundland. The costs of outpatient services, where provided, are shared in the same proportion as those of inpatient services. Monthly advances are made to the Provinces pending final calculation of these figures at the year's end.

To give an example of how this grant formula works, the average per capita cost of inpatient services for Newfoundland in 1959 is currently estimated by the Department of National Health and Welfare at \$17.17, and for Canada at \$21.84. (Details of how these figures are computed will be examined later.) Newfoundland then receives 25 percent of its per capita cost, or \$4.29, plus 25 percent of Canadian per capita cost, or \$6.21, making a Federal contribution to Newfoundland for inpatient services of \$10.50 per person. Ontario, whose per capita cost is estimated at \$26.60, would receive \$6.65 plus \$6.21, totaling \$12.86—a larger absolute amount per capita, but a smaller proportion of total cost per capita.

Since the Provinces with the lowest per capita hospital costs are also the poorest, this formula does tend in fact to give greatest assistance to those with the lowest fiscal capacity. The formula is designed, however, to exert an equalizing influence on hospital standards

Note on Federal Aid to Health Programs in Canada

While Canada, particularly in the postwar years, has placed growing emphasis on unconditional fiscal aid to the Provincial governments, the conditional grant programs have not been neglected. They have covered a wide range with heavy emphasis on health and welfare.

The relative importance of conditional and unconditional grants has been sharply altered, however, with the coming into effect of hospital insurance in July 1958. With only six Provinces participating in the first year, the Federal cost in fiscal year 1959 should not exceed \$70 million. With all Provinces in, the cost will rise to about \$200 million. Total conditional grant payments have not much exceeded \$100 million in any year since the old age security payments became a sole Dominion responsibility in 1952.

In all its conditional grant programs, Canada has resisted the arguments in favor of fiscal need differentials in the scale of payments to the various Provinces. This was not because the Provinces do not differ widely in their relative wealth. They do, indeed. Personal income per person varies from \$768 in Prince Edward Island to \$1,676 in Ontario, with a national average of \$1,395. Rather, it was because in recent years these programs had developed alongside the general unconditional fiscal aid arrangements, which, it was felt, made a fiscal aid factor in the conditional grant programs superfluous.

This unconditional assistance has increased substantially from year to year, but nevertheless it could be said with good reason that these special programs laid a heavier proportionate burden on the revenues of the poorer Provinces, sometimes with budgetary side effects in the relative emphasis accorded different services.

The problem was further complicated with the hospital insurance program by its very size, which

made the relationship to the scale of unconditional aid rather tenuous, and by the fact that standards of facilities and services differed widely from Province to Province. These widely different standards were not considered in keeping with a truly national scheme, and some additional incentive to improvement was required. Further, it was realized the scheme would never get off the ground in the poorer areas without a special stimulus. The situation was modified substantially by the expectation, based on experience, that costs would tend to even out as facilities were developed. Any large cost differential was considered likely to be of fairly limited duration.

The method devised to meet the situation was unique, at least in Canada's experience. The Federal share was to be 50 percent of the accepted cost. To meet the special regional problems it was decided to pay each Province 25 percent of the average per capita cost of hospital services in Canada as a whole plus 25 percent of the average per capita cost in each Province, multiplied by that portion of the Provincial population eligible under the particular scheme.

Thus, although the Federal cost is 50 percent for Canada as a whole, it is more than 70 percent in the poorest Province with lowest costs and between 45 and 50 percent in wealthier areas with well-developed services.

The contribution of this distribution to the fiscal well-being of the Provinces is secondary. The real test will be whether it is successful in raising standards of care in the less-favored Provinces of the federation, as would seem proper in a scheme that it essentially national.—R. M. BURNS, *Director, Federal-Provincial Relations Division, Department of Finance, Ottawa.*

rather than to equalize hospital costs as such. A poor Province such as Newfoundland, which now has nearly three-quarters of the cost of its plan paid by the Federal Treasury in Ottawa, will be enabled to raise salaries and improve standards in its hospitals. As it does so, the per capita cost of hospital service under the Provincial plan will rise and the proportionate

contribution of the Federal Government will fall.

There are no limits on the size of the Federal contribution. This exerts economic pressure upon the Provinces to increase the scope of their hospital plans by including services optional under the Federal act, such as outpatient service and rehabilitation programs.

- Diagnostic procedures together with necessary interpretations, including laboratory and radiological tests (but excluding clinical procedures related to diagnosis, which are considered medical rather than hospital services).

- Operating room, case room, anesthetic facilities, and such items as routine surgical supplies.

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To give an example of how this grant formula works, the average per capita cost of inpatient services for Newfoundland in 1959 is currently estimated by the Department of National Health and Welfare at \$17.17, and for Canada at \$24.84. (Details of how these figures are computed will be examined later.) Newfoundland then receives 25 percent of its per capita cost, or \$4.29, plus 25 percent of Canadian per capita cost, or \$6.21, making a Federal contribution to Newfoundland for inpatient services of \$10.50 per person. Ontario, whose per capita cost is estimated at \$26.60, would receive \$6.65 plus \$6.21, totaling \$12.86—a larger absolute amount per capita, but a smaller proportion of total cost per capita.

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The Federal act and the written agreements with the Provincial governments setting up the framework of the national hospital insurance program in Canada allow considerable individuality in Provincial plans.

Differences in Provincial Plans

The method of financing the Provincial share of the cost of the plan is one point of difference. Four of the eight Provinces with plans now in operation (Ontario, Manitoba, Saskatchewan, and New Brunswick) have chosen to levy premiums on the insured population. Annual rates are \$25.20 for single persons and \$50.40 for families in Ontario, \$24.60 and \$49.20 in Manitoba, \$17.50 and \$35 in Saskatchewan, and \$24.60 and \$49.20 in New Brunswick (5). The other Provinces finance their share from general revenue or special sales taxes.

On the issue of compulsory versus voluntary coverage, clearly only "premium Provinces" can allow residents a choice of whether to contribute or not. The Ontario plan makes coverage compulsory for employees working in establishments of more than 15 persons, but for others it is optional, with voluntary registration and payment of premium. This arrangement was adopted not out of deference to the principle of voluntarism, but rather because of the difficulty in collecting compulsory contributions among small groups and the self-employed. Alternatives to the Provincial plan in the form of nonprofit or commercial insurance for basic hospitalization are now forbidden, so the effective choice for Ontarians is Provincial hospital insurance or no hospital insurance. Ninety-three percent of the population of Ontario is now in fact covered by the Provincial plan. New Brunswick and Prince Edward Island have adopted similar arrangements, but in all other participating Provinces coverage is in effect compulsory for all residents.

Deterrent charges, or "hesitation fees," have been adopted by two Provinces of the eight. British Columbia, whose plan dates from 1949, continues to charge \$1 per day for hospitalization. Alberta levies a variable charge of from \$1.50 to \$2.00 per day depending upon the size of hospital, and a flat \$1 per day (up to a maximum of \$30) for newborns. These charges

are expected to meet only a small part of total cost—about 6 percent in British Columbia and 12 percent in Alberta (4)—and their main intent is to control utilization.

Each Province must provide at least the inpatient services specified in the act. Most of them, for the present, limit services insured under the Provincial plan to this level, but there is nothing to prevent a Province from providing a wider range of services if it wants to pay for them itself. Thus, Ontario and in effect Saskatchewan as well have chosen to include care in mental and tuberculosis hospitals as part of insured benefits, the additional costs being met entirely from Provincial revenues. Whether as a part of insured hospital benefits or under other public programs, the Provinces of Canada, like the States in the United States, subsidize care in tuberculosis and mental hospitals.

Insured outpatient services, optional to the Provinces, vary across the country. Newfoundland, for example, provides outpatient laboratory and radiological services, encephalograms, cardiograms, and basal metabolism estimates, all together with necessary interpretations, radiotherapy and physiotherapy treatment for ambulatory patients, and other outpatient care provided by salaried hospital staff. At the opposite end of the scale, Alberta provides no outpatient services at all. All other participating Provinces include at least emergency outpatient service within 24 hours of an accident (48 hours in Nova Scotia). The small range of outpatient benefits in several Provinces is regarded as temporary, to be liberalized as the plan gets underway. Manitoba has already (in February 1959) extended its coverage of outpatient benefits in the interest of reducing pressure on inpatient facilities, and others may follow suit shortly.

Limitations on drugs that may be prescribed as part of insured hospital service also vary. Most Provinces have left the matter to be decided according to accepted medical practice, with some provision for medical review. Saskatchewan and British Columbia, possibly through longer experience, have listed certain exclusions. Saskatchewan, for example, excludes amino acids, injected antibiotics other than penicillin, and streptomycin; and British

As far as the Provincial authority is concerned, these services may be added to the plan at half cost, since the other half is paid by Ottawa. It is hoped that, as facilities become available, this pressure will induce all Provinces to provide the maximum range of services allowed under the act.

The maximum cost of the program to the Federal Government, with all Provinces participating, has been estimated at \$215 million per year at current prices (4). Provincial governments collectively would provide an equal amount, making the maximum total cost of the program \$430 million, or about 1.3 per cent of the Canadian gross national product. An equivalent figure with regard to the U.S. economy at the present time would be in the region of \$6 billion. Very little of the program cost represents new cost to the economy: it represents rather a consolidation of the expenditures for hospital service formerly made by individuals (either directly or indirectly through insurance), charitable groups, and all levels of government under a number of smaller programs.

The Federal Government finances its share from consolidated revenue; there is no special Federal tax for the hospital insurance program.

The Provincial Agreements

Thus far, only Quebec has failed to take advantage of the new program. Two Provinces, British Columbia and Saskatchewan, have had compulsory hospital insurance plans for some years, and these came into the national program substantially unchanged. Manitoba, Alberta, and Newfoundland commenced their plans on the effective date of the act. The last two of these previously had partial hospital plans—a municipal hospital program in Alberta and the Cottage Hospital program in Newfoundland—which have been incorporated in the new arrangements. Ontario and Nova Scotia started their plans on January 1, 1959, and New Brunswick on July 1, 1959. The remaining Province, Prince Edward Island, is expected to have an operative plan by the end of the year. Plans for the two Federally governed Territories in the north are fairly well advanced, and it is hoped to bring them in early in 1960.

The blueprint for each participating Provincial plan is contained, as mentioned earlier, in a formal agreement signed by both Federal and Provincial governments. This agreement is paralleled by enabling legislation in the Provincial legislatures and forms in effect a contract between the two levels of government. A list of the points that must be covered in each Provincial agreement is specified in the Federal act.

First, a schedule of hospitals which are to provide insured services is specified. These include general, chronic, and convalescent hospitals and such facilities as laboratories and radiological centers, but not mental and tuberculosis hospitals or nursing homes as such. It was felt that individual listing was simpler and more flexible than attempting to define broadly the type of "hospital and other facility" to be included. As well as the scheduled hospitals, which form the majority, there are also listed a small number of contract hospitals (usually company hospitals in outlying areas) which are reimbursed for insured services at an agreed flat rate per capita rather than according to actual expenses. Psychiatric wards in general hospitals can be included, although separate facilities for mental care can not.

The Provincial agreement also lists other acts of Provincial and Federal legislatures which already entitle certain groups of persons to hospital benefits. These include legislation regarding workmen's compensation and benefits for veterans, servicemen, and Royal Canadian Mounted Police. Benefits provided under these special acts are not paid for again by the Provincial hospital insurance plan, although of course the necessary services may be given in Provincial hospitals.

The "scheme for administration" is an integral part of the written Provincial agreement. This includes details of the appointment and duties and responsibilities of the Provincial hospital authority; arrangements for licensing and inspecting hospitals; method of reimbursing hospitals for insured services; and plans for future development of health services in the Province.

Finally, the agreement specifies the range of drugs and biologicals to be supplied in hospitals as part of insured hospital service.

ple, have Provincial arrangements which finance a large part of the hospital's capital cost, while others leave this to local communities, voluntary giving, or market fund raising. With such wide differences in capital costs, it was felt that a program designed primarily to insure hospital services should cover the operating costs only.

There were other subsidiary reasons for excluding capital costs. Sharing capital costs might involve the Federal Government in the difficult and controversial question of who owns the hospitals. It was desired to avoid any charge of nationalizing the hospital system. Also, it was felt that the continued need for local communities and their local and Provincial governments to finance the bulk of their capital costs themselves would insure maintenance of local interest and participation in hospital affairs, and would restrain the urge to build unnecessary facilities in small communities for reasons of local prestige rather than medical need.

Actually, hospitals are not left entirely unassisted with their capital costs. In hospitals employing volunteer labor, there will be considerable surplus on account of salaries which may be applied to meeting interest payments. Federal and Provincial aid with hospital financing under programs unconnected with the hospital insurance program continues. There is also in the act one provision designed to allow a certain amount of "free money" to hospitals to use as they wish. In general, the costs of services not insured by the Provincial plan are not reimbursed by the Provincial authority, since the patient is charged for them directly, but, of the amounts receivable (less bad debts) from patients for accommodation above ward level (representing the extra cost to the hospital of providing this preferred service), only one half must be deducted from total cost. This means, in effect, that the patient is charged for the additional cost of a private room, and then the hospital receives half this amount again from the Provincial authority. In hospitals which provide a considerable amount of non-ward care, this provision will allow a substantial inflow of free funds which may be used for capital purposes.

There are also certain other minor hospital

costs which must be deducted before the hospital's bill is sent to the Provincial authority. In general, all sales and recoveries fall into this category; this might include such items as private laundry, sale of drugs not provided under the Provincial plan, and sale of cigarettes and candy. The hospital cannot charge the Province for functions which are already paid for from other sources, for example, training of personnel to the extent that it is financed by health grants and other governmental programs. The costs of providing noninsured services, such as ambulance service, must likewise be excluded from the hospital's accounting of allowable cost.

Sharable Cost

The Province's hospital bill consists of the consolidated amounts paid to all scheduled hospitals in the Province, as described above, together with amounts paid to the contract hospitals for insured services they provide. Administrative costs of the Province's program, as distinct from administrative costs of individual hospitals, are not included, although some help may be made available for technical consultant and research services under the separate health grants program.

Several more adjustments have to be made, however, before the Province's "sharable cost," the cost which the Federal Government is to share in, is finally determined.

There will be in each Province some hospitalization provided to residents of other Provinces who are insured under the plan of their Provincial government. The costs of these services are reclaimed from the home Province of the persons concerned, and, therefore, must be deducted from the total Provincial cost. A similar deduction must be made for persons treated in Provincial hospitals whose care is already paid for under existing Federal and Provincial acts (for example, veterans and those receiving workmen's compensation), and for those whose care is claimable under the terms of any private liability insurance contract. The purpose of these provisions is to avoid duplication of payment for the same service. Added to the Province's hospital bill, however, are the corresponding amounts paid to other Provinces for care provided to insured persons and, incidentally,

Columbia, cortisone and ACTH. Saskatchewan maintains an approved list of new drugs. All Provinces exclude preparations sold under the Proprietary or Patent Medicines Act. Excluded drugs may, of course, be used in hospitals, but the patient must pay for them.

The Provinces are required to name an authority responsible for the operation of the Provincial plan. In three of them, Saskatchewan, Alberta, and Newfoundland, a division of the Provincial health department has been given administrative responsibility. These three all had hospital plans of greater or lesser scope under their departments of health before the new program commenced. British Columbia, which also had an earlier plan, has retained its separate Hospital Insurance Service which reports through a commissioner directly to the Provincial minister of health, and Manitoba has adopted a similar arrangement. Ontario, Nova Scotia, and New Brunswick have set up independent hospital commissions with membership representative of medical, hospital, labor, and other fields. Prince Edward Island is expected to do likewise.

Hospital Costs

Individual hospitals are reimbursed in full by their Provincial hospital authorities for the operating costs incurred in providing insured services under the Provincial plan. The detailed procedure for making these payments varies among the Provinces. Most Provinces make monthly or semimonthly advances to the hospitals according to a per diem rate established from the annual budget for each hospital, with necessary adjustments being made at the year's end when the final accounting of actual costs is completed. Ontario tried a dry run in 1958, before payments were actually commenced, to familiarize all concerned with this procedure. Some Provinces differentiate fixed and variable hospital costs, paying the hospital a flat monthly or semimonthly sum plus an amount varying with the hospital's actual patient load.

All scheduled hospitals in each participating Province are required to render uniform accounts of their costs, which are ultimately audited at both Provincial and Federal levels. Items that seem excessive or unnecessary in re-

lation to costs in other hospitals may be disallowed, although close cooperation between the various accounting units augurs a minimum amount of friction in this respect. A useful byproduct of this system will be the further standardization of hospital accounting procedures across Canada—already made reasonably uniform by use of the Canadian Hospital Accounting Manual—which will eventually yield much valuable comparative information on hospital costs.

The calculation of what the allowable cost actually is in each hospital is naturally a complicated accounting process which cannot be fully described here. Some general features will be described, however, because they are crucial to the financial relationship between hospitals, Provincial hospital authorities, and the Federal Government.

Total hospital costs include all normal operating expenses of the hospital such as wages and salaries, surgical supplies, food, linen, purchases of furniture and technical equipment (other than ambulances), and administration. Volunteer labor, paid nominal or no wages, may be counted as if it were paid in full at going rates, an important provision particularly for hospitals run by religious orders.

The allowable hospital cost, however, does not include interest and carrying charges on the hospital's outstanding debt or depreciation on hospital plant, buildings, and land. This important exclusion in effect restricts the program to current hospital expenses, leaving capital costs to be financed by the hospital itself or the Provincial government as before. Hospital deficits, therefore, are not necessarily wiped out, and the program offers no direct assistance with the costs of construction or hospital expansion.

This exclusion of capital costs is the principal point of controversy in Canada over the act. Why was it decided to do this? Primarily, because no equitable formula could be devised that would include capital costs without unduly favoring some hospitals and Provinces at the expense of others. The amount of outstanding hospital debt and the degree of assistance given hospitals by their Provincial governments differ widely across Canada. Some Provinces, British Columbia, for exam-

Canadian health picture would not be complete without mention of how it affects other Federal health programs and voluntary health insurance.

The health grants program, inaugurated in 1948, is the other major Federal health program. It provides Federal funds and technical assistance to the Provinces for specified health projects and has expanded continuously since its inception (6). The purposes for which the grants are made, together with amounts appropriated for all Provinces in 1959 (7), are:

Purpose	Amount (in millions)
General public health.....	\$8.5
Tuberculosis control.....	4.2
Mental health.....	7.2
Veneral disease control.....	.5
Crippled children.....	.5
Training of health personnel.....	.5
Cancer control.....	3.6
Public health research.....	.5
Hospital construction.....	17.4
Laboratory and radiological services.....	8.5
Medical rehabilitation.....	1.0
Child and maternal health.....	2.0

These grants continue alongside the new hospital insurance program, except that some of them which cover services now a mandatory part of Provincial hospital insurance plans, for example, laboratory and radiological services, now go only to nonparticipating Provinces. Most of the grants are made for specified projects which are subject to Federal approval. In most cases, each Province is allotted a maximum amount under each category of health grant, with provision being made for transfer from one category to another of any surpluses left over.

The grants for hospital construction were doubled shortly before national hospital insurance came into effect and extended to cover costs of constructing interns' quarters and renovating old premises. They now provide approximately \$2,000 Federal funds per bed, with a requirement for Provincial matching.

Some services optional to the Provinces under the hospital insurance program may alternatively be eligible for assistance under the health grants program. For example, several Provinces have chosen to continue rehabilitation programs under the terms of the health

grants program because in this way the programs can be restricted to certain needy groups of beneficiaries; if these activities were included in the hospital insurance program, they would have to be universally available to all residents of the Province.

The medical profession in Canada endorsed the hospital insurance program, guided largely by favorable reports from its members in British Columbia and Saskatchewan who had worked under Provincial hospital insurance plans for some years. Hospitals appear to have reacted favorably. In Quebec, there is reported to be considerable pressure from hospitals for entry into the program, and it is expected that ultimately Quebec will join, making the program truly national in scope.

As might be expected, a radical change has been wrought upon the voluntary hospital insurance picture. At the end of 1957, before the program came into effect, about 7.7 million Canadians had some hospital insurance coverage under private or nonprofit plans. With allowance made for duplication, this accounted for about 52 percent of the population exclusive of Saskatchewan and British Columbia, where compulsory hospital insurance plans were already in effect (8). As of January 1, 1959, the date the Ontario and Nova Scotia plans came into operation, nearly 11 million persons, or 67 percent of the population, were eligible for benefits under the new national hospital insurance program. By the end of 1959, the only Canadians not eligible for benefits will be the 4.6 million who live in the nonparticipating Province of Quebec.

Private insurers and Blue Cross plans continue to write hospital insurance for service above ward level in most Provinces. In Ontario, indeed, the hospital commission has offered to collect premiums for private and nonprofit insurers to facilitate this extra coverage. The new pattern is not yet sufficiently established to know how many persons will purchase additional insurance, but, as an indication, in British Columbia in 1957, about 6.6 percent of the population was covered by voluntary hospital insurance for preferred accommodation in addition to basic Provincial coverage (9). Voluntary insurance for surgical and medical expense is, of course, unaffected.

to hospitals in the United States which treat visiting Canadians.

In the Provinces which charge deterrent fees for hospitalization, the amounts thus collected must be deducted from the total sharable cost, since they represent a part of hospital service paid for directly by the patient.

Once the total Provincial sharable cost has been determined, it is divided by the Provincial population for the per capita cost of hospital services in the Province. Twenty-five percent of this cost and of the Canadian per capita cost are added and then multiplied by the average number of insured persons reported at the end of each month in the year, to arrive at the Federal Government's contribution. In Provinces where the Provincial share is financed through sales tax or general revenue and coverage is universal, the number of insured persons equals the Province's population as estimated by the Dominion statistician. In the premium Provinces—particularly in Ontario, where coverage is partially optional—the insured population must be estimated from enrollment records. At the Federal level, the Canadian per capita cost, which includes all of Canada, is computed from the consolidated returns of all participating Provinces and estimates for the nonparticipating Provinces and Territories.

Hospital Care

The foregoing section should not be allowed to leave the impression that the main emphasis of the Canadian program is financial. All the costing details relate ultimately to the primary purpose of the act—furthering the provision of hospital service in the Provinces.

The actual quality of hospital care provided under the program must constitutionally remain a Provincial responsibility. There is no Federal intervention in hospital management, other than the requirement that Provinces arrange satisfactorily for supervision, licensing, and inspection of hospitals and "make such arrangements as are necessary to ensure that adequate standards are maintained in hospitals" (2).

However, institutions scheduled in the Provincial agreement as hospitals for purposes of cost sharing under the act must be approved by both Provincial and Federal authorities. It is clearly in the interests of the Provinces, as

well as the institutions themselves, to have as many marginal hospitals upgraded to meet Federal requirements as possible. This is expected to be effective particularly in the area of long-term care establishments which might more strictly be defined as nursing homes, but which can provide the type of care for chronic and convalescent patients required by the act. Two such establishments in Peterborough, Ont., were licensed as chronic hospitals for purposes of the act, although most other nursing homes in the Provinces were found to lack the necessary facilities for consideration under the program at present. Parts of institutions that might otherwise be excluded, for example, tuberculosis sanatoriums, many of which now have unoccupied beds, have also been licensed for general care in some parts of Canada. The list of scheduled hospitals and facilities in each Provincial agreement is subject to frequent revision and amendment.

In all Provinces where hospital insurance programs have been newly established, the expected increase in demand for bed space has materialized to some degree. Figures are not as yet available, but nowhere has the shortage of hospital space amounted to a crisis. A part of the increase is expected to be temporary, caused by persons who postponed treatment to take advantage of the new insurance, especially in Provinces such as Ontario where details of the plan were publicized for many months before the plan became effective.

The Ontario Medical Association and others have organized medical staff committees to review admissions and discharges. Some Provinces have had to embark upon an expansion of hospital facilities in order to provide the contracted services. Nova Scotia, for example, had an estimated shortage of 2,000 beds at the time the program came into effect, but with aid from an expanded health grants program has already made up 1,300 of this deficiency. Each Provincial agreement is required to outline the Province's plan for organized expansion of facilities in the future, an incentive to the orderly development of Provincial hospital service.

The Health Field

An account of the way in which the new hospital insurance program has fitted into the

Stream Life Below Industrial Outfalls

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The following brief review of present knowledge of the biological effects of industrial wastes in water is offered in anticipation of publication of a detailed book on this subject. The text will cover methods of presenting biological data (touched on here) and sampling equipment indicated for stream surveys. It will carry a full bibliography. Only a few outstanding references are cited in this article.

THAT DAY is dead when it seemed only natural and logical for Americans to discharge raw industrial wastes to the most convenient stream. The recognized need to protect the Nation's basic and essential water resource has brought all artificial additions to the stream under critical scrutiny. The present task is to establish reasonable appraisals of the various effects of specified industrial effluents. Conversely, we seek to learn how certain biological effects may serve as indicators of forms or degrees of industrial pollution in a stream.

What are the outstanding detrimental effects of industrial wastes on aquatic life? How do certain nutrient wastes contribute to the growth of biological nuisances? Comments on these questions are offered with confidence that they will be viewed in the large perspective that embraces all forms of stream pollution, including those provoked by improvident abuses of the

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land, excessive use of water, and failure to regulate streamflow. The contribution of domestic sewage and the scouring effects of peak flows also are assumed as being understood in the general context of these remarks.

The major emphasis here falls on four factors in industrial wastes that are responsible for the most subtle environmental effects: elevated temperature; particulate matter, contributing to turbidity and the formation of settleable solids; nutrients, favoring blooms of aquatic weeds and pests; and radioactive elements. These conditions in turn produce forces damaging to the productive use of the water resources.

Elevated Temperatures

The effect of a mild heating of natural waters, its influence on the metabolic processes of biota as reflected in measurements of oxygen demand, oxidation, and reaeration, has long been recognized, if not fully understood. As temperature of water rises, oxygen becomes less soluble. Under a pressure of 760 mm. in fresh water, the concentration of dissolved oxygen at 0° C., is 14.62 ppm; at 20° C., 9.17 ppm; at 39° C., 7.63 ppm. The mere heating of a stream can deny stream life its normal supply of oxygen. Coupled with putrescible pollution, which increases the total demand for oxygen, a rise in temperature may deplete the oxygen level to a stage of asphyxiation for aquatic organisms, which cannot survive in such competition.

Another subtle effect of a rise in temperature is reflected, on occasion, in the increased toxicity of certain chemicals. For example, exposed to 0.4 ppm rotenone, brown trout die in 15 minutes at 21.11° C., in 70 minutes at

Blue Cross, as such, has virtually disappeared in most of Canada. However, the disappearance may be more in name than in fact, because the personnel, records, and experience have in most cases been absorbed directly into the new Provincial hospital organizations. In Ontario, for example, the 500 employees of the old Ontario Hospital Association's voluntary plan have all been transferred to the new Ontario Hospital Commission and continue to perform the same function on a larger scale.

The new hospital insurance program has been called by one Federal official "the most significant development in the health field in Canadian history" (7). It clearly goes far toward meeting what Hon. J. Waldo Montieth, Minister of National Health and Welfare, termed "the obvious needs of Canadians for an orderly and economic means of obtaining basic hospital care" (10). Because of the close similarities between Canadian health needs and our own, the further development of this experiment will bear close watching from the United States.

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Grants for Extramural Research in Nursing

Ten new awards, totaling approximately \$250,000, have been granted for extramural research in nursing by the Public Health Service, bringing to 73 the total of grants awarded under the nursing research grants program since its inception in 1955. Awards to persons outside the Service for studies on nursing and improvement of patient care, now amounting to \$3 million, are administered by the Division of Nursing Resources in cooperation with the Division of General Medical Sciences of the National Institutes of Health.

The recent awards are for studies on cardiac and psychiatric nursing, nursing education (including improvement of research competence), and the educational and socioeconomic factors affecting nurses.

ville. Seines and various dip nets in the reach of the Mahoning from below Warren through Lowellville in September 1952 failed to take fish when industry was discharging wastes, including hot water, in addition to raw municipal sewage. At this time, several chemical and physical factors, in addition to heat, could have been considered equally lethal or detrimental to fish, for example, pH as low as 2.4, dissolved oxygen as low as 0.2 ppm, and various high concentrations of industrial and municipal sewage solids.

In July during the extended steel strike, when pollution was largely produced by raw domestic sewage, although there were also residual industrial effects, fish were taken at Girard and above Indian Run Creek in Youngstown. At Girard temperatures varied from 23.5° C. to 29.5° C.; dissolved oxygen varied from 5.0 to 5.6 ppm; and pH from 6.9 to 7.4. Northern creek chub and goldfish were taken at Girard. Fish taken at the Indian Run Creek station under comparable temperatures and pH and dissolved oxygen ranges were the large-mouth black bass and the common shiner. At upstream control stations above Leavittsburg in July and September, with stream temperatures varying from 24° C. to 31° C., the dissolved oxygen from 5.7 to 6.9 ppm, and the pH from 7.0 to 7.6, sampling obtained a variety of fish: white crappie, small-mouth black bass, northern creek chub, green sunfish, northern black bullhead, bluntnose minnow, and golden shiner.

A field survey of the fisheries related to heat discharged by the New Johnsonville steam plant on Kentucky Lake indicates that a localized warming effect, over that of contiguous waters in the impoundment, served to attract fish and help them survive during cold-water periods (11). Warm water from the steam plant may serve as a winter refuge for threadfin shad. These fish abounded in the steam plant discharge harbor, warmed by condenser water discharges to 12.78° C., when other water of Kentucky Lake was 7.22° C.

Information on the effects of hot condenser water discharged from a steam-electric generating plant to Martins Creek, Pa. (which, in turn, feeds heat to the Delaware River), so far has been inconclusive (12). These studies are continuing. An example of temperature

dissipation in the area of the Delaware illustrates how rapidly temperature can be dissipated in a flowing stream, although the situations described are never exactly repeated. At a railroad bridge 1,500 feet below the heat source, the maximum temperature was 32.22° C., at 2,000 feet 30° C., at 2,750 feet 22.78° C., at 3,600 feet 21.66° C., and at 4,500 feet 20° C. The initial temperature of discharge water is not available.

Particulate Matter

Turbidity, which is considered to be an expression of the optical property of water which causes light rays to be scattered and absorbed rather than transmitted in straight lines, is increased by various forms of particulate matter in suspension (fig. 1). Such matter may include phytoplankton or zooplankton cells, such as algae and protozoans, or silt or other fine materials. Particulate matter in any form that settles to form organic or inorganic sludge is described here as "settleable solids." These solids include matter which increases turbidity.

Many industrial operations contribute settleable solids to water. Apart from the chemical activity that may be provoked in water by such particulate matter, the physical effects on aquatic life are often severe. Some industrial discharges of particulate matter are coal and other mineral products, including washery by-products; glass sand; lumber; aluminum, steel, and other metals; pulp and paper; wastes from slaughterhouses, canneries, tanneries, and dairies; and oil.

Since such wastes in suspension limit the penetration of sunlight, they impede the growth of aquatic plants attached to the bottom as well as floating or weakly swimming algal forms. Being photosynthetic, these organisms depend on light for existence. Solids also flood planktonic algae and even surface animals and carry them to the bottom to die. By limiting growths of aquatic plant meadows, the wastes starve organisms which feed there. The food chains are interrupted, and aquatic life in general becomes sparse.

As particulate matter settles, the deposits can blanket the substrate. Such a physical en-

12.78° C. With dosage of 0.2 ppm, they die in about 22 minutes at 21.11° C. and in 100 minutes at 12.78° C. (1). But this gain in toxicity with heat is not the rule for all chemicals or species. At 10° C. and 25° C., there is no observed change in the toxicity of ammonia to clabs. Further, it has been demonstrated that toxicities of potassium dichromate and naphthenic acid were similar at 18° C. and 30° C.

For students of the effects of temperature on fish, laboratory studies offer a wealth of data which cannot be summarized here, but several such summaries are in the literature (2,3). J. R. Brett's "Some Principles in the Thermal Requirements of Fishes" is an especially useful and comprehensive review of this subject (2).

In industrial waste field surveys of large streams, it may be difficult to relate detrimental effects of temperature (heat pollution) to specific aquatic organisms. In bodies of water, such as the Mahoning River in Ohio, where temperatures become high enough to be lethal to most aquatic organisms in outfall areas, deleterious conditions arise also from other factors, such as low dissolved oxygen, high turbidities and settleable and floating solids, and pH and chemical toxicity.

Hot industrial discharges can be disastrous to fish. Also, high temperatures may alter the entire biosphere. By eliminating many organisms, heat may allow a few, such as the heat-resistant blue-green alga, *Phormidium*, to become dominant. Ranges in which algae are known to grow best in general are from 18° C. to 30° C. for diatoms, 30° C. to 35° C. for greens, and 35° C. to 40° C. for blue-greens. Some species grow at even higher temperatures (4). Gross limits of temperature (5) that most warm-water fish experience in natural bodies of water are somewhere between 0° C. and 35° C. (32° F. to 95° F.). If water of 30° C. is available, warm-water fish may seek it, leaving 32° C. water. Among warm-water fish are sunfish, catfish, carp, and many minnows. Cold-water fish, such as the salmonoids, salmon and trout, normally live in natural waters that range between 0° C. and near 18.34° C. (summer temperature). They usually do not tolerate temperatures above 27.23° C. Certain trout have been reported as surviving temperatures of 27.78° C. to 28.34° C. for very

short periods in natural water (5,6). The Aquatic Life Advisory Committee of the Ohio River Valley Water Sanitation Commission, referring to waste discharges, recommended that temperatures not be raised above 34° C. (93° F.) "at any place at any time," and stated that temperatures during December, through April should not exceed 23° C. (73° F.) "at any place or at any time" (7). The report emphasizes that natural temperatures must be maintained in streams suitable for trout propagation.

No one knows precisely how varying temperatures affect all the biota of a stream. However, in general, it appears that in most temperate zone streams of low gradient, large reaches should not exceed 30° C. for prolonged periods, and that headwater streams ought not be warmer than the top range of 22° C. to 25° C. for extended periods. Further research is more likely to reduce than raise these limits (8).

As examples on record of streams affected by high industrial heat discharges, one can mention the Mahoning River in the Warren-Youngstown, Ohio, reach; the Kentucky Lake site of the New Johnsonville steam plant, Martins Creek, Pa., site of the steam-electric generating plant on the Delaware River west bank several miles downstream from Belvidere, N.J.; and the waters near the Front Street power station at Erie, Pa.

Temperatures in the Mahoning River have exceeded those tolerated by fish and other aquatic organisms. The "Ohio River Pollution Control" document prepared by the Public Health Service states, "During periods of low streamflow the water temperature below Youngstown has risen often to over 43.34° C." (9). It is reported in "Water Resources of the Mahoning River Basin" that, when the last of four reservoirs went into operation, flows have been such that the maximum daily temperatures have only occasionally been above 37.78° C., and that monthly mean temperatures have been below 36.66° C. (10). During a survey in July and September 1952 of the Mahoning (Pricetown to Lowellville reach) in which Ingram participated, maximum temperatures for 12 stations occurred in September and were 35.1° C. at Struthers and 34.5° C. at Lowell-

a rich diet of insects which, in turn, enjoy numerous algal species. The main observation is that there is a great variety of species represented by a few individuals of each form.

In the zone of degradation, floating solids blanket out the light penetration. Moving into the zone of active decomposition, as these solids settle, sludge blankets the entire bottom. Turbidity makes the water almost opaque. Only a few species can survive in the soft, shifting sludge. Being isolated from most competitors and predators, a few species here form huge populations. The few animal forms that thrive in a sludge substrate are bloodworms, *Tubifex*, and *Limnodrilus*; water sow-bug crustaceans, *Asellus*; certain left-handed snails; and various leeches. Fish are absent or scarce. They prefer to nest elsewhere. Aquatic plants are not able to root. Species of algae are extremely limited: blue-greens, such as *Phormidium* and *Oscillatoria*, form gelatinous slimy blankets over the sludge in shallow marginal water. Only an occasional plankter moves

through the water in the zone of active decomposition; most have been dragged out of the upstream water in the zone of degradation to suffocate in the clinging wastes.

A detailed description of a bottom covered with inert inorganic solids suggests an aqueous desert rather than the jungle of bloodworms found in organic sludge. Data collected in September 1952 (fig. 3) and again in September 1958 portray the physical effect on aquatic life of waste from a glass-sand operation on a small creek feeding the Potomac River. Below this creek reaches a submarine Sahara, dotted with a few rare oases. In 1958, above the point of confluence, the Potomac was sparkling clear, bedded by a bottom of rocky ledges, rocks, coarse gravel, and some natural clean sand, lush with beds of higher aquatic plants, such as *Elodea* and *Potamogeton*. Gill-breathing snails and mayflies dominate invertebrate life everywhere on the substrate. Large unionid, pearl-button clams dot the margin. Minnows swarm in the sunlight. The filamentous alga, *Clado-*

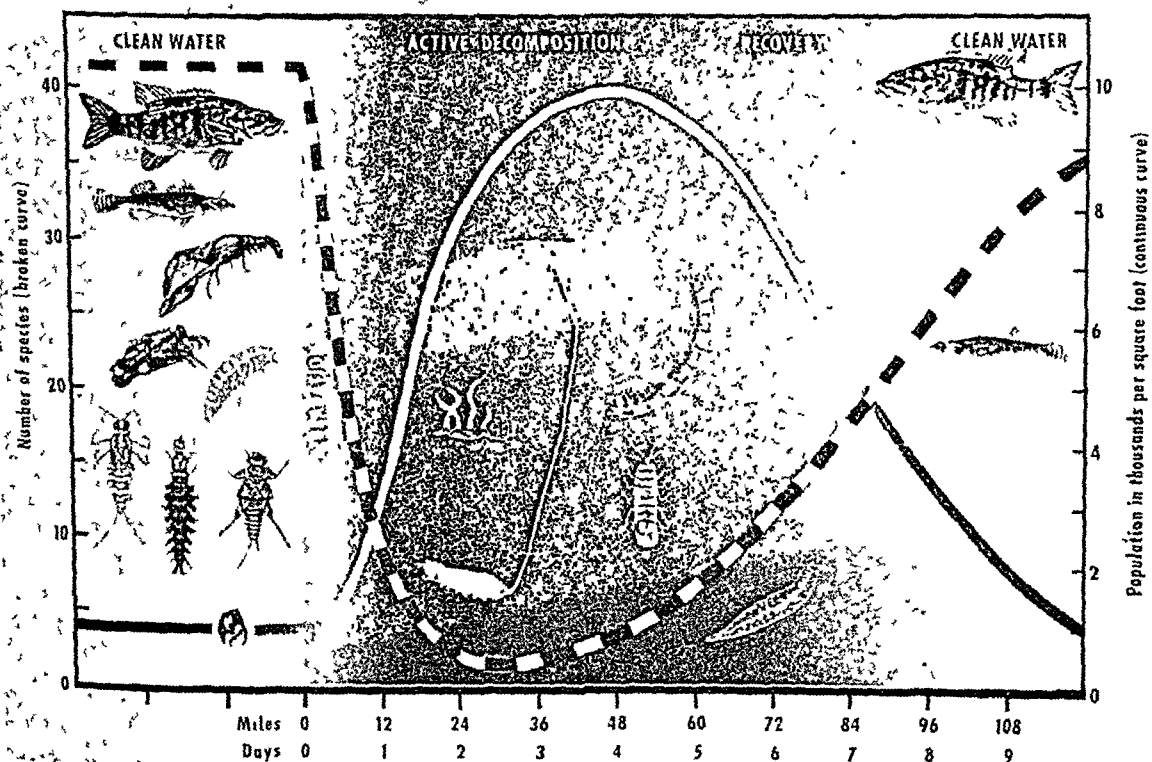


Figure 2. Biological effects of organic sludge

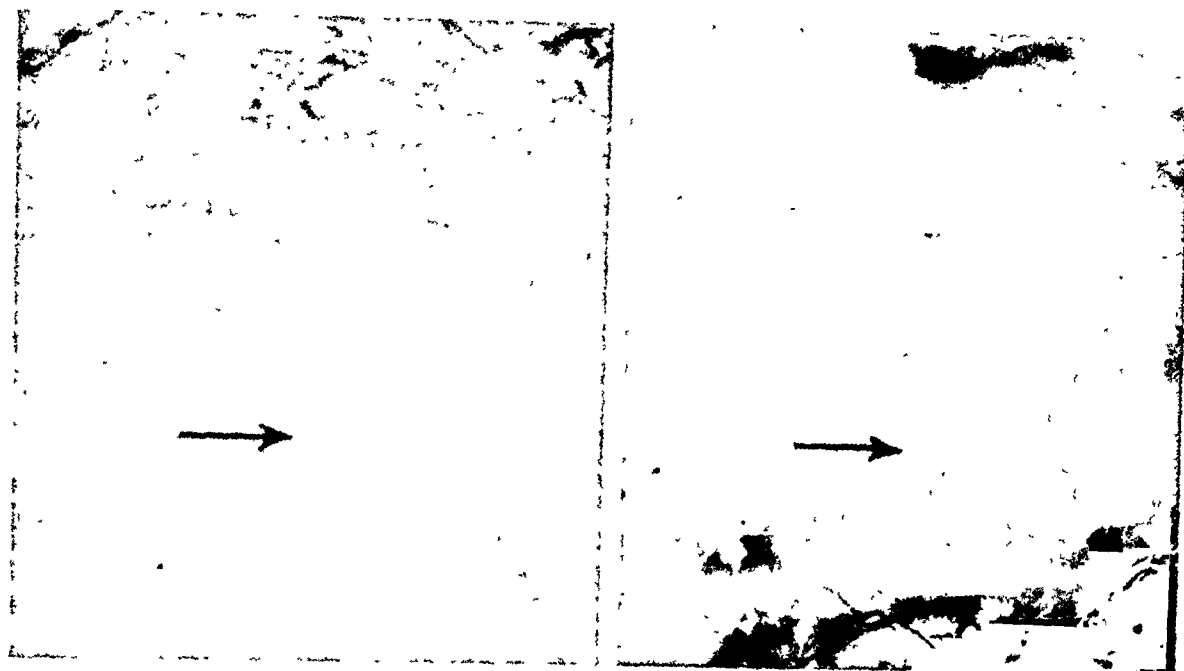


Figure 1. Stream turbidity

(Left) Arrow points to a dime in clear water of Potomac River with low turbidity. (Right) Dime is obscured by high turbidity resulting from inert particulate matter discharged from an industrial operation.

vironment is unacceptable to organisms that would normally occupy such a habitat. Not only industrial wastes but also silt produced by soil erosion is said to alter aquatic environments, chiefly by screening out light, by changing heat radiation, by blanketing the stream bottom, and by retaining organic material and other substances which create unfavorable conditions at the bottom. Also, it has been stated that the developing eggs of fish, as well as fish food organisms, may be smothered by deposits of silt (1). Direct injury to fully developed fish apparently by nontoxic suspended matter has been demonstrated only in tests with concentrations which are uncommon (2).

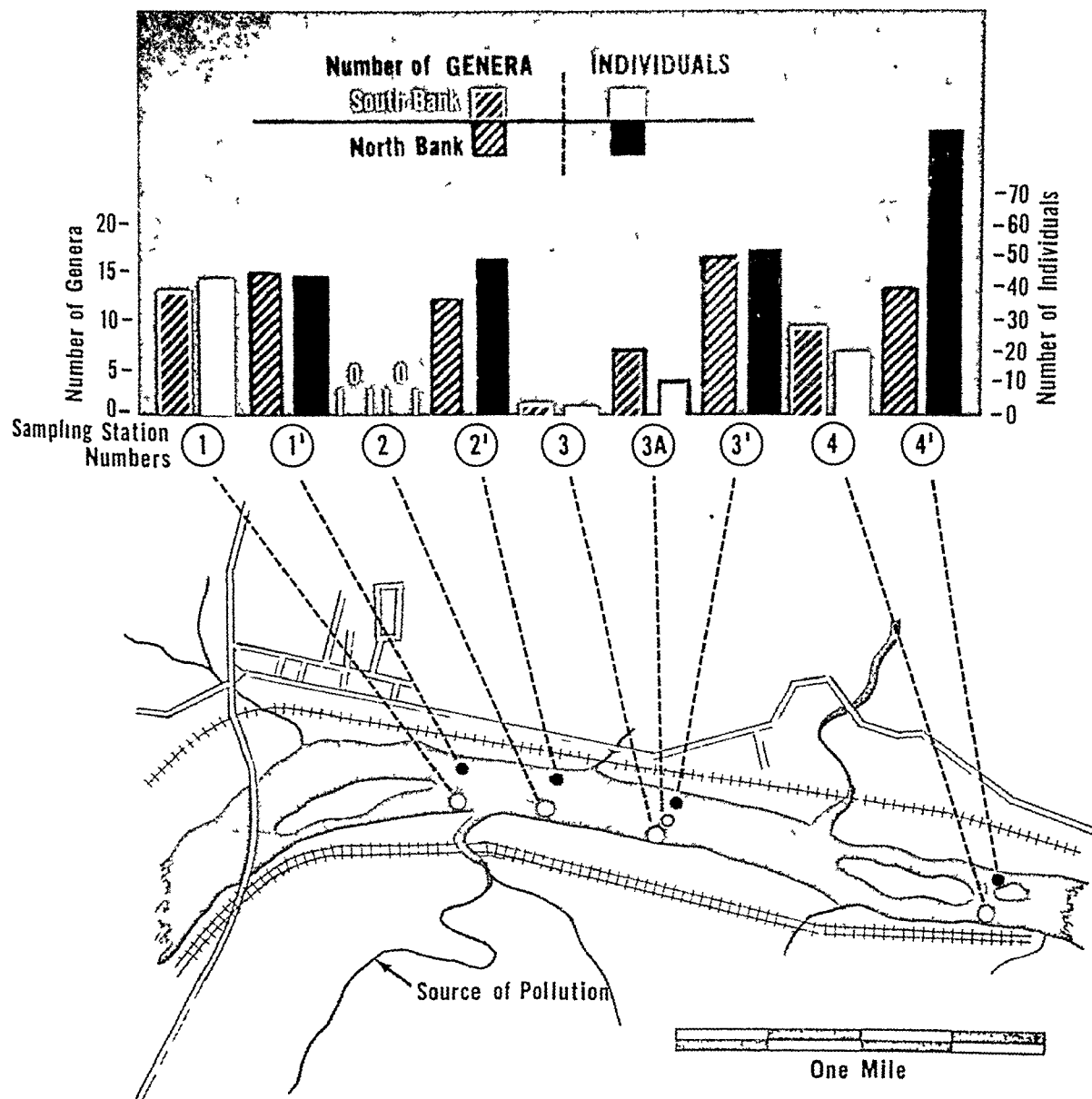
Quite different physical effects on stream life result if the bottom blanketing deposits are dominantly organic rather than inorganic. If they are not highly toxic and if the supply of dissolved oxygen is satisfactory, soft organic sludges will give rise to organisms adapted to that environment. On the other hand, inert solids, such as glass sand and other mineral wastes, destroy bottom life. Fewer organisms can live among compacted, heavy abrasives characteristic of such wastes. These wastes may actually simulate "ball-mills," grinding

and crushing life that is contacted on a stream bottom, as they are resuspended and moved downstream by periodic surges of high water.

The physical effects of organic sludges of industrial origin are partially illustrated in figure 2, describing a hypothetical situation based upon specific data gleaned from field investigations. It is assumed, for this discussion, that the deposits are not appreciably toxic and that the dissolved oxygen resources are adequate for aquatic life. Settleable solids enter the stream at mile 0 and organic sludge deposits of maximum thickness are formed in the zone of active decomposition between miles 12 and 48. Turbidities are highest between miles 0 and 12. Sludge deposits are not significant elsewhere, and turbidities elsewhere are also unimportant.

In the clean water zones, the bottom is composed of small and large stones. Here a multitude of different species of bottom organisms, plankton, and fish abound. Typical of the species on this bottom are caddisfly larvae, stoneflies, mayflies, hellgramites, gill-breathing snails, and unionid clams. There are many spots where fish may nest. Small-mouth black bass, sunfish, and various minnows flourish on

Figure 3. Physical effects of glass-sand operations, Potomac River, September 1952



NOTE: This pictorial map combined with vertical bar graphs showing variations in bottom animals per square foot in a section of the Potomac River illustrates use of a graph to demonstrate the impact of pollution on aquatic life, replacing a long list of names of animals and plants found in an affected stream. The presentation shows sampling stations in relation to roads, railroads, and towns. The effects of inert, inorganic solids in limiting the number of animal genera and individuals (stations 2-4 on the south side of the

river) are compared with their abundance at stations in unaffected stream areas (1 on south side and 1'-1'' on the north side). Stations 1 and 1' are used as controls. Solids are carried into the main river from the tributary at the confluence between stations 1 and 2. Bottom animals are absent at downstream station 2. Only 1 genus was collected at station 3 on the south half of the bottom, while 7 genera were taken in the center of the river (3A) and 16 genera on the bottom of the northern half of the stream (3').

phora, covers much of the rocky area. Eleven genera of planktonic and filamentous algae and eight genera of animals are represented in our collections from this station.

At a station 600 yards below the confluence of the small creek (receiving glass-sand wastes) with the left bank of the Potomac, the bottom of the river was devoid of life in 1958, as it was in 1952. Blue-green algae grew marginally on the wave-wash area of the bank. This paucity of organisms extended to midstream, where 3 genera of snails and 10 genera of planktonic algae were collected. From the left bank (looking upstream) to the midstream rocky ledges, the rocks, gravel, and sand of the original Potomac River bottom were covered completely up to 2 feet deep by waste glass-sand fines. During the period when samples were collected in 1958, the sand lines desert was spectacular in clear water. Turbidities attributable to this operation were found to vary tremendously in 1958 with waste discharges, from 130 turbidity units to 50,000 turbidity units. The effects of such discharges in 1958 were observed to suppress bottom life as far as 10 miles downstream.

Excess of Nutrients

Overproduction of any plant or animal is a sign of an unbalanced ecology. The degree of disequilibrium may be a portent of disaster as when a rise in human population taxes a land's limited natural resources. Likewise overpopulation of a lake with shad may present a sudden and unwelcome abundance of protein at the shore.

Wastes with substrates of nitrogen, phosphorus, carbohydrates, and fats may have the potential of forming through hydrolysis in enzymatic systems, readily available end products of organic foodstuffs such as amino acids, simple sugars, fatty acids, and glycerol. These feed animals or stimulate aquatic plant growth. Such wastes may build up such a plant or animal nuisance growth that water uses are impaired. Organisms that flourish typically with certain of such nutrients are the sewage bacterium, devil grass (*Sphaerotilus*), and certain planktonic and sessile algae.

Algal and *Sphaerotilus* blooms that interfere

with multiple uses of water result from a nutritional process that is not immediately relevant. However, the damage they do is likely to continue, and other nuisances may ensue. If streams, lakes, and manmade impoundments continue to be enriched with wastes of industrial, municipal, and agricultural origin, biological nuisances will be intensified and new unspoiled areas will suffer.

Sphaerotilus, the filamentous-plumose flocc-forming bacterium, is not now susceptible to control. Research has not revealed treatment methods that have been productively put into operation on a plant-scale basis, either to prevent or eliminate the growth, despite the best efforts of the pulp and paper industry to foil this gelatinous pest (14, 15).

Sphaerotilus abounds in certain reaches of the Columbia River in Washington and Oregon; Altamaha River, Ga.; Hiawasee River, Tenn.; New River, Va.; Penobscot River, Maine; Clearwater River, Idaho; Fox and Menominee Rivers, Wis.; and Bear River, Utah.

It occurs in restricted patches in the Connecticut River, Mass.; Ohio River, downstream from Cincinnati, Ohio; Grass River, N.Y.; Potomac River drainage in Maryland; South Holston River, Tenn.; as well as in smaller streams throughout the country.

Without an inventory to indicate the current abundance of *Sphaerotilus* in waterways of the United States, there can be no valid assessment of its distribution and the magnitude of its nuisance value. Too, only such an inventory can relate the subtlety of its development to bloom proportions to nutritional substrates from various types and combinations of waste and runoff.

Sphaerotilus has become recognized as a pest in recent years principally because of its interference with both commercial and sport fishing. Its effect on the gill-net commercial fisheries of the Columbia River is notorious. Specific complaints have been voiced also by fishermen on the Altamaha River in Georgia and the New River in Virginia. The major realistic objection is that *Sphaerotilus* flocs, entangled in fishing gear, hinder the catch and add to the work (16).

Sphaerotilus, in forming blooms, especially

dustries that used lake water had to install expensive "filtering and purifying systems" to remove the organic matter and overcome obnoxious tastes and odors. Oxygen in the deeper water declined so that trout and one species of whitefish disappeared, and two other species of whitefish became scarce. Other species, largely coarse, replaced the sought-after game fish. The shallower basin, Obersee, which received no urban drainage, is reported to have retained its "virgin-lake" characteristics and has changed but little. Unwitting fertilization not only causes nuisances, but hastens the extinction of a lake by accelerated sedimentation, according to records for 37 lakes in the United States, Austria, England, Finland, Germany, Italy, and Sweden. In these lakes, eutrophication within several decades has entailed disagreeable consequences similar for the most part to the events in Lake Zurich (19).

Effects on lakeside dwellers have been well documented for algal blooms on certain lakes near Madison, Wis. Especially during hot summer periods, lakes assume the appearance and consistency of thick green pea soup. At such times, the reaction of bathers, sailors, and fishermen may be imagined. The unsightly masses of green as they decompose, also produce vile odors that make life in the area hardly tolerable (20).

Algal blooms have been responsible for massive fish kills by reducing the resources of dissolved oxygen. During daylight hours, algae and submersed aquatic plants give off oxygen by photosynthesis, commonly raising the dissolved oxygen resources to supersaturation levels. But photosynthesis does not proceed during hours of total darkness although respiration continues. In streams with huge algal blooms, dissolved oxygen in these circumstances may be reduced below survival points. In Lytle Creek, Wilmington, Ohio, dissolved oxygen fluctuated over 24 hours from 19.4 ppm in the afternoon to 0.7 ppm before dawn. A fish kill in this creek was attributed to oxygen depletion, largely by algal respiration (6). Fish kills under similar conditions have been reported for East Okoboji Lake and Storm Lake, Iowa (21), and other such disasters have occurred in the Ohio River Basin (22).

Radioactive Wastes

Recommendations as to maximum levels of radioactivity in water or aquatic organisms are outside our province, except for the general acceptance of the principle that any addition to the prevailing burden of radiation should be judiciously considered, and that unnecessary additions be eschewed. Rather than evaluate the effects of given quantities of radioactivity, this discussion is confined to the quality or character of the process by which certain nuclides, through biological adsorption and absorption, are cycled into human food chains, as shown in figure 4 (23). By such processes, radioactive atoms are concentrated to relatively high orders of magnitude by organisms living in blooms in natural waters.

Concentration of radionuclides in edible fish and their subsequent lodging in human tissue is readily visualized. Less obvious is the potential transport of radionuclides into human tissues after algal blooms have increased the concentration in raw-water sources. Even though such blooms are caught on rapid sand filters and backwashed to carry them out of the drinking water supply, there remain opportunities for radionuclides to pass through the filters into finished water. As algal cells fragment on filters, they may release atoms in solution in the drinking water. Also, water supplies without treatment other than chlorination can carry algal cells with adsorbed and absorbed radionuclides directly into the drinking water supply.

Davis and Foster have cautioned that the recommended maximum concentrations of radioactivity in water do not in themselves limit the degree of biological concentration: "With an increasing number of atomic energy installations and their associated problems of disposal of liquid wastes, we recognize that more and more aquatic environments are going to be exposed to at least low concentrations of radioactive materials. For the safety of human populations who may be drinking water which contains such radioactive materials, a set of maximum permissible concentrations has been recommended (International Commission on Radiological Protection, 1955). By themselves, however, such recommendations are in-

in riffle areas with other associated bacterial slimes, may blanket the bottom, "crowding out" fish food organisms and spoiling potential fish nesting areas.

Prospective difficulties from *Sphaerotilus* are: (a) clogging of rapid sand filters of municipal and industrial water treatment installations, (b) tastes and odors in water produced by decay, (c) mucilaginous nuisances in pumping stations and in irrigation canals, and (d) contact nuisance to swimming, water skiing, and boating.

The process by which excess nutrients are released to create algal and rooted aquatic plant nuisance growths can be diverted rather than inhibited. In modern waste treatment practices, dissolved inorganic or mineral constituents of municipal sewage and industrial wastes are removed only incidentally by sedimentation and oxidation. Also certain organic materials are broken down, with treatment, to liberate inorganic nitrogen and phosphorus. Treatment plant effluents may actually contain more readily available nutritional substrates than are found in raw sewage effluents. In order to limit the fertilizing effect of sewage and of certain nontoxic industrial wastes, such wastes ideally should be excluded from natural lakes and impoundments. Despite exclusion of nutrient-bearing wastes, agricultural drainage, carrying nitrogenous and phosphorous compounds, will especially provide nutrients that may encourage green aquatic plant nuisances.

It has been shown that, if assets of inorganic nitrogen and phosphorus exceeded 0.30 and 0.01 ppm, respectively, at the start of the active growing season (the time of spring turnover in northern climates), a season with nuisance algal blooms could follow (17). This suggestion was made following 2 years of study on 17 lakes in southeastern Wisconsin. While it does not apply to all lakes, it has stimulated other investigations.

The facts today indicate that, with continual nutrient enrichment of waters, algal nuisances have only begun to demonstrate what they may become in future years. Domestic sewage alone may vary in its nitrogen content from 15 to 35 ppm and in phosphorus from 2 to 4 ppm (18). In relation to these nutrients, it has been stated:

"A large percentage of these fertilizing elements exists in a readily available condition or becomes so during biological treatment or while undergoing stabilization by microorganisms in the receiving body of water. Consequently, it can be reasoned that sewage contains nitrogen and phosphorus in a ratio of about 8 to 1" (18). Data on increments of nitrogen and phosphorus from various industrial operations are not at hand but the total contribution of industrially produced chemicals offers many complications to the biochemistry of the water resource.

Specific contributions by agriculture of nitrogen and phosphorus to bodies of water by runoff are not known. However, data provided by the U.S. Bureau of Reclamation points to increments of nutrients in the soil. A 1955 estimate of an average use of fertilizer per irrigated acre in California is 382 pounds, of which 42 pounds per acre are nitrogen and 26 pounds per acre are P_2O_5 .

The effects of algal nuisances have long been known to the waterworks field. Algal blooms cause tastes and odors in water, clog rapid sand filters, and form unsightly scums on basins in water treatment installations. In future years, those charged with management of water projects, such as the many multiple purpose reservoirs that are being constructed in this country, are likely to encounter a variety of biological nuisances, especially algal blooms, nurtured by nutrients introduced by man. In summarizing information on European lakes, the data suggest the potential biological nuisance that can arise, with time, in our reservoirs (19). But little has been published on lake fertilization (eutrophication) to show systematically the effects of nutrients on the lake ecology and on the uses of lake water.

Lake Zurich, Switzerland, composed of two arms connected by a narrow channel, less than 100 years ago is stated to have been clear and clean, supporting trout and whitefish. Since the turn of this century, urban drainage from small communities totaling about 110,000 persons has been discharged to one arm of this lake. Beginning in 1896, algal scums formed that were malodorous as well as unattractive. The lake ceased to be enjoyed for bathing, boating, and general recreation. The cities and in-

could not accurately be predicted. Results indicate that concentration of very short-lived isotopes is of limited consequence in higher organisms such as fish. Radiophosphorus, on the other hand, is concentrated more than 100,000 times. Although the P^{32} is highly concentrated, existing amounts in the Columbia River are well below dangerous levels. Even in the most radioactive section, the young fish receive only about 0.1 rad per day from beta emitters—far less than the amount which would produce discernible damage. Both laboratory and field studies of river forms have shown no injurious effects from the presence of the reactor effluent. It is questionable that widespread decimation of aquatic populations will occur from radiation damage in situations where contamination levels in fish must remain below maximum permissible levels for human food. The difference in the activity density of Columbia River fish over that of the water, owing to the tremendous power of aquatic forms to concentrate some radioisotopes, illustrates the need for careful consideration of potential hazards prior to disposal of liquid wastes to public waters. If radiophosphorus were allowed to reach the maximum level permitted for drinking water, organisms living in the water would suffer radiation damage and the fish would be unsafe for human food. The seriousness of radioactive contaminations in an aquatic environment depends not only upon the quantities of individual isotopes which may be released but also upon the physical, chemical, and biological properties of the water. Where contamination of a river or lake may be significant, careful investigation of each particular case is essential since complex biological processes may introduce hazards not included in such conventional limits as permissible concentrations for drinking water."

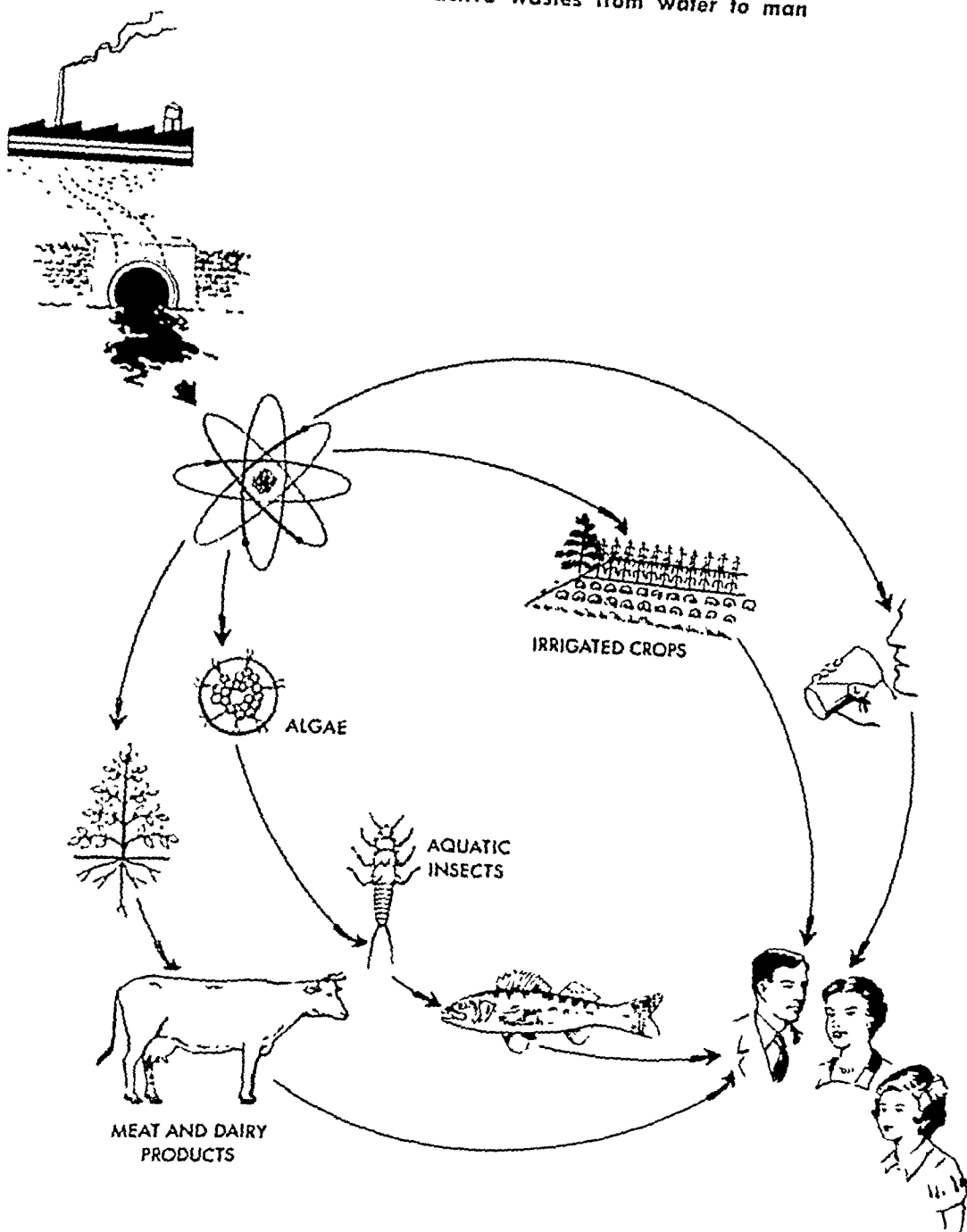
For the immediate future, increased radioactivity in streams is likely to cause little apparent damage to aquatic life or human welfare. The long-range prospect, however, even on the basis of present burdens of radiation, offers no grounds for complacency or assurance.

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Figure 4. Radioactive wastes from water to man



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adequate to define completely the radiological hazard which may develop through aquatic food chains. Where biological systems are involved, the organisms may accumulate certain isotopes to many times the initial concentrations in the water" (24).

The International Conference on the Peaceful Uses of Atomic Energy enlarged upon information pertinent to this discussion (25): "Extensive studies have been made of the radioactivity in river organisms below the Hanford reactors, since the radiation levels

could not accurately be predicted. Results indicate that concentration of very short-lived isotopes is of limited consequence in higher organisms such as fish. Radiophosphorus, on the other hand, is concentrated more than 100,000 times. Although the P^{32} is highly concentrated, existing amounts in the Columbia River are well below dangerous levels. Even in the most radioactive section, the young fish receive only about 0.1 rad per day from beta emitters—far less than the amount which would produce discernible damage. Both laboratory and field studies of river forms have shown no injurious effects from the presence of the reactor effluent. It is questionable that widespread decimation of aquatic populations will occur from radiation damage in situations where contamination levels in fish must remain below maximum permissible levels for human food. The difference in the activity density of Columbia River fish over that of the water, owing to the tremendous power of aquatic forms to concentrate some radioisotopes, illustrates the need for careful consideration of potential hazards prior to disposal of liquid wastes to public waters. If radiophosphorus were allowed to reach the maximum level permitted for drinking water, organisms living in the water would suffer radiation damage and the fish would be unsafe for human food. The seriousness of radioactive contaminations in an aquatic environment depends not only upon the quantities of individual isotopes which may be released but also upon the physical, chemical, and biological properties of the water. Where contamination of a river or lake may be significant, careful investigation of each particular case is essential since complex biological processes may introduce hazards not included in such conventional limits as permissible concentrations for drinking water."

For the immediate future, increased radioactivity in streams is likely to cause little apparent damage to aquatic life or human welfare. The long-range prospect, however, even on the basis of present burdens of radiation, offers no grounds for complacency or assurance.

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New Index Medicus

The indexing activities of the National Library of Medicine, Public Health Service, and the American Medical Association will be coordinated, according to plans approved by the Board of Regents of the library and the House of Delegates of the American Medical Association. The cooperative arrangement will go into effect in 1960.

Beginning with the January issue of that year, the National Library of Medicine will publish monthly issues only of a new medical index to be called the *Index Medicus*. The American Medical Association will issue annual cumulations of the index, to be known as the *Cumulated Index Medicus*.

Each monthly issue of the *Index Medicus* will contain entirely new material. The coverage of this index will be substantially increased over the present 110,000 to 120,000 articles in the *Current List of Medical Literature*.

After completion of the December 1960 issue, the library will rearrange and realphabetize by machine the contents of the year's 12 issues of the *Index Medicus*. The rearranged material will then be photographed by a high-

speed step camera, and the film copy will then be transferred to the American Medical Association for direct use in the preparation of printing plates.

In 1879, publication of a monthly index to the periodical literature of medicine, the *Index Medicus*, began at the National Library of Medicine. In 1916 the American Medical Association commenced publication of a quarterly index to medical periodical literature under the title *Quarterly Cumulative Index*. In 1927 the two publications were combined under the joint sponsorship of the library and the medical association to form the *Quarterly Cumulative Index Medicus*. Since 1932 the medical association has been solely responsible for publishing the quarterly index. With volume 60, covering the period July-December 1956, publication of the quarterly will cease.

Subscriptions for the *Index Medicus* will be handled by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.; the *Cumulated Index Medicus* will be distributed separately by the American Medical Association.

An essay on the forces of nature observed by research biologists working on the treatment of waste highlights the dramatic challenges of sanitary engineering.

Observations and Speculation on Waste Treatment Research

BERNARD B. BERGER

GILBERT WHITE, the great English naturalist of the 18th century, noted that dung dropped by cattle standing in ponds became food for aquatic insects, which in turn became food for fishes. He observed: "Thus nature, a great economist, converts the recreation of one animal to the support of another" (1).

The phenomenon of the food chain which so impressed itself on the good Reverend's attention is still of enormous interest to biologists, particularly to those working in the field of waste disposal. Certainly we have gained a great deal of sophistication in biology in the last few centuries. Our colleagues in the biological sciences speak now of ecologic systems, food chains, food webs, energy flow and balances, and material transformations. Our knowledge has been vastly extended in phenomena related to the interdependence of species and in all the subtle, delicate mechanisms by which micro-organisms react to their environments.

For approximately one-half century, our col-

leagues and our predecessors have been applying their best knowledge to creating optimum environments for the satisfactory disposal of human wastes. We now have at least a basic understanding of the biological communities on which we depend for waste stabilization. We have rational and intellectually satisfying procedures for designing trickling filters, activated sludge systems, and waste stabilization ponds for the intensive bio-oxidation of putrescible materials, and in a reasonably accurate fashion we may predict a stream's ability to assimilate such materials. Much has been accomplished, therefore, since the Reverend Gilbert White made his shrewd observation. However, it must be admitted we are still a long way from desirable control of the biological processes of interest, particularly with respect to new organics with which our microbial communities have had no experience.

In the course of our striving to understand and to control this biological action, many observations of interest have been made and we have speculated long as to their nature. In discussing some of these odd observations, what I have to say represents my own views and not necessarily those of the biologists with whom I have been associated. It is, perhaps, much easier for me, a sanitary engineer and in a sense an outsider, to speculate on this subject. This I shall proceed to do with a free hand.

Mr. Berger is chief of the Research Branch, Division of Water Supply and Water Pollution Control, Robert A. Taft Sanitary Engineering Center, Public Health Service. This paper was presented at the Manufacturing Chemists' Association meeting in Cincinnati, Ohio, March 18, 1959.

Although many of you have seen a trickling filter in a sewage treatment plant, probably few have ever run fingers through the slime covering on the filter rock, wondering what was in it and how it could be so effective and so reliable in treating highly putrescible human wastes. This organic film is obviously a filthy, slimy mess, but it holds great interest for the biologist. Dr. Bridge Cooke, our mycologist, recently completed an intensive study of the surface of trickling filters serving Dayton, Ohio, and what emerged from his report was an entrancing picture of a jungle in microcosm (2).

The slime was virtually a reproduction of the earth surface, especially with respect to the harsh competition for survival among organisms. The fungi in the slime held tightly to the underlying rock and gave the slime its structural strength. Filamentous algae likewise gave support to the slime layer. The fungi were akin to jungle trees, and the filamentous algae akin to green foliage. Broad savannahs were represented by extensive growths of surface algae. A variety of protozoa and higher animals browsed among the diverse plant life, and still others preyed indiscriminately on microscopic forms. Feeding on everything they contacted were insect larvae, worms, and snails. Here, in the slime, as in our familiar life, it is an eternal struggle for survival. Fortunately for us, the survivors represent a well-balanced energy and material flow, assuring good waste treatment.

The presence of the algae in the slime film was especially interesting. Obviously, they were thriving. Through their photosynthesis they were producing oxygen, much of which presumably remained dissolved in the film. Could this oxygen possibly be of any use in supporting the respiration of the micro-organisms feeding on the organic wastes? What gave point to this question was the common knowledge that the interface between the slime film and the atmosphere presents a barrier to oxygen movement. Here at the filter surface we have perhaps a built-in oxygen supply. Calculations based on the density of algal growth and on their normal rate of oxygen production indicated that if the entire slime film could be exposed to daylight or its equivalent, the total

oxygen requirement for stabilization of the organics could be met by algal photosynthesis alone.

Is it possible to open up a trickling filter so that every part of its surface may be exposed to daylight? There actually seems to be no good reason why novel surfaces arranged in perhaps an unconventional manner may not be used. It may well be that we have here a possible scheme for deriving another benefit from our algae, that is, growing them in a form for easy harvesting so that the high protein concentrations in their cellular material may be recovered with economic benefit. This possibility is envisaged also in the work of the University of California on oxidation ponds, or waste stabilization ponds, as a means of sewage treatment. I believe it is correct to say that a major deterrent to the application of the oxidation pond is the lack of an economical way of capturing and removing in concentrated form the algae suspended in the pond mass.

We may go beyond secondary benefits and consider the possibility of tertiary values that could result from the removal of nitrates and phosphates in solution by our algae. This is really an enormously interesting prospect in view of the increasing troubles being experienced all over the country with dense, highly objectionable algal blooms in our streams and lakes. The use of algae in special ponds to remove these minerals from sewage treatment plant effluents is under intensive study by Dr. Rohlich and his colleagues at the University of Wisconsin in Madison, and by others.

Recently I re-read that series of papers on activated sludge studies conducted by Theriault, Butterfield, McNamee, Ruckhoft, and others engaged in research at the station now known as the Robert A. Taft Sanitary Engineering Center. This set of papers is, incidentally, a classic of sanitary engineering. These engineers and scientists attempted to come to grips with basic questions of activated sludge treatment, addressing themselves to such fundamental questions as: What is activated sludge? How does it form? What is its function in waste treatment? Much sewage has flowed over the weir since then, and it is not necessary now to go into the spirited debates of a generation ago, debates on chemical oxidation versus bio-oxida-

tion, the significance of bioenzymatic action, the identification of slime-producing bacteria, and the general phenomenon of clarification. However, certain questions remain as stubbornly unresolved now as they were a generation ago.

One cannot but wonder what competitive advantage in the fight for life this jelly-like matrix called activated sludge confers on the organisms able to produce it. I put this question to our experts, physical chemists as well as biologists, and was assured that this slimy material is an excellent food-gathering mechanism. By processes of adsorption and absorption, nutrients are removed from the flowing waste and are brought within reach of the organism. This, I am sure, is true. But it is also, after all, a physical barrier to predators normally feeding on free-swimming bacteria. Does this film, therefore, provide a physical security to the organism as well as a more assured food supply? That the element of physical security is present is suggested by the work of many investigators. The following statement was made by Butterfield (3) in 1935: "Colpidium (a protozoan) added to a container of zoogaea bacteria gave slightly better BOD removal and much clearer effluent than zoogaea bacteria alone. Microscopic tests showed that the free-swimming bacteria had been eliminated."

The gelatinous matrix we also call "floc" definitely has survival value for the organisms. It protects them from their enemies while simultaneously bringing them food. In protected environments where food is plentiful, not only will the organisms survive, but they will grow fat. This is expressed in the polysaccharides composing the floc. So much is produced that, in waste treatment, we are forced to discard the great bulk of floc.

This matter of floc production and of the competitive advantages it provides recalls the discussions of about a generation ago on the physiological function of shells grown by marine animals on the ocean floor. In "Patterns of Survival" by John Hodgdon Bradley, the following is quoted from the address given in 1934 by the retiring president of the Paleontological Society. "All animals, and many plants, ingest with their water and food more calcium carbonate than they can profitably use. The problem of eliminating this surplus min-

eral material has always been most successfully solved by active living. The most energetic organisms possess light silicious or chitinous skeletons or no skeletons at all. The sluggards carry heavy shells." Competition forced the weak and lazy toward the ocean bottom where they are able no longer to cope with the involuntary accretion of calcium carbonate. "The more indolent began to grow shells."

Perhaps our friends, the slime-producing bacteria, are also indolent. This should not be surprising in view of the bountiful food supply they enjoy.

It is not really suggested that life in the slime is an easy one. The lurking predator sees to that. As a matter of fact, the predator is essential to a healthy system. Otherwise, our bacteria would grow fat, lazy, and inefficient.

Strange things sometimes happen in a treatment system, particularly when an intruder upsets the delicate balance. Last year when a maverick fungus got into the experimental activated sludge units (4), it succeeded in a very short time in exterminating a species of rotifer, minute bacteria-eating animals, important in the biological balance of the system. As a result, the stabilization process stopped dead.

It is well known that an effective biological treatment system depends on the voracity of microscopic animals. Their essential job is to keep the working microbial population fit and active. Recent discoveries suggest they play another important role by inhibiting the growth of *Sphaerotilus natans*, the so-called sewage fungus, which is associated with sludge bulking and fouls our streams. When Dr. Clarence Tarzwell was studying Lytle Creek, he found that profuse growths of this nuisance were accompanied by swarms of single-cell, microscopic animals, mostly ciliates and rhizopods (5). It appeared that the amebalike rhizopods, in particular, had keen appetite for this bacterial weed. A personal communication from Dr. H. Heukelekian of Rutgers University indicates that a rotifer with a similar function has been found.

When Butterfield was engaged in his study on the identification of organisms in the activated sludge floc, he recorded an observation which impresses me as being particularly odd. It occurred while he was trying to isolate bac-

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Designs for Retirement

We have created an economy which forces people to give up their usual activities while many years of life yet remain. We have still to apply ingeniously and imaginatively the knowledge we now have to the creation of a way of life in which the retired continue to share in the social process.

The increasing commitment of American society to an extended period of retirement was recognized by the University of Michigan in planning its 12th Annual Conference on Aging, held June 22-24, 1959, in Ann Arbor.

With "Designs for Retirement" as its theme, the conference brought together more than 1,000 figures in gerontological thought to explore the nature and implications of individual and social factors in aging. The scope of these pertinent facets of retirement living was reflected by the five major segments in which the conference was divided: financing, health, housing, preparation, and uses.

An assessment of past experience and current research gave new insights into systems of cultural values, use of free time, services, varieties of suitable housing and living arrangements, and programs of individual preparation to give vitality, meaning, and social significance to the retirement years.

Five briefs of papers delivered at the conference follow.

Work, Income, and Housing

brief Improvements in medical procedures, new medications, and upgrading of nutrition here and throughout the world are enabling more men and women to live beyond their 65th birthday. Since the turn of the century, the number of people aged 65 and over has increased more than 3½ times, from 3 million to more than 14 million, while the total population barely doubled. By 1980, it is estimated the number of aged in the United States will have risen to some 25 million in an anticipated population of roughly 260 million.

Only a fraction of the aged population in the United States is institutionalized. The last complete census in 1950 showed that only 3.1 percent of the persons 65 years of age or over

Based on a paper presented by E. Everett Ashley 3d, director, Statistical Reports and Development Branch, Housing and Home Finance Agency.

teria from the gelatinous, zooglea matrix by washing it with distilled water. He reported as follows: "In carrying out this cleansing procedure, an unexpected phenomenon was encountered. During the course of the washing, the embedded bacterial cells would free themselves from the gelatinous matrix and move away with incredible speed, dispersing themselves throughout the dilution water long before a satisfactory washing had been accomplished" (3). Subsequent observations suggested that the bacteria had left the gelatinous matrix because no nutrient was being absorbed. The dispersing action was prevented by washing with water containing dissolved organic material. The interpretation of this occurrence is, in my opinion, simple. Bacteria have to feed continuously. When their food concentrating mechanism fails them, they are literally forced to leave their homes and go searching for food.

Butterfield's observation is of particular interest in the light of a recent report by Dr. Herman Amberg indicating that, in the laboratory, growth of *Sphaerotilus* could be prevented by substituting a schedule of intermittent discharges of pulp mill wastes for one of continuous discharge (6). Perhaps here too, the individual organisms composing the *Sphaerotilus* filaments were forced to leave their abode during the period of no discharge and seek their food by freely swimming about. Although I am not aware of any extensive observations on this point, the hypothesis is appealing.

We are slowly learning more of what goes on in the microworld of waste treatment. Eventually we may even be able to develop microbial systems to handle lignins and certain synthetic organics that presently pass through treatment practically unaltered in character or concentration. The success of geneticists in developing new strains of bacteria encourages use of their techniques in research. This goes much further than simply exposing the organisms to the organic chemicals, hoping they will, through hunger, learn how to use them as food. Bac-

teria can be trained. They have excellent capacity for adapting themselves, and they breed so fast that a mutant strain can quickly establish itself in the appropriate environment.

We are engaged in developing intelligent ways of getting micro-organisms to accept strange compounds as nutrients, shocking them if necessary into evolving the necessary appetite and digestive muscle to do the job efficiently. However, we have much to learn ourselves before we can, in scientific fashion, routinely mold microbial communities into smoothly functioning organizations for breaking down highly complex compounds.

Bacteria must feed on highly energized carbon and nitrogen compounds to satisfy growth and living requirements. They soon learn to relish most manmade compounds, even very complex ones. Others they reject, presumably because certain molecular structures are too hard to break up and digest. Perhaps, if research is sharp enough, we may be able to identify many of these barriers and learn how to overcome or avoid them. It is evident that we must learn more about bacterial enzyme systems, particularly how to stimulate the development of new ones.

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Only a fraction of the aged population in the United States is institutionalized. The last complete census in 1950 showed that only 3.1 percent of the persons 65 years of age or over

Based on a paper presented by E. Everett Ashley 3d, director, Statistical Reports and Development Branch, Housing and Home Finance Agency.

teria from the gelatinous, zooglea matrix by washing it with distilled water. He reported as follows: "In carrying out this cleansing procedure, an unexpected phenomenon was encountered. During the course of the washing, the embedded bacterial cells would free themselves from the gelatinous matrix and move away with incredible speed, dispersing themselves throughout the dilution water long before a satisfactory washing had been accomplished" (3). Subsequent observations suggested that the bacteria had left the gelatinous matrix because no nutrient was being absorbed. The dispersing action was prevented by washing with water containing dissolved organic material. The interpretation of this occurrence is, in my opinion, simple. Bacteria have to feed continuously. When their food concentrating mechanism fails them, they are literally forced to leave their homes and go searching for food.

Butterfield's observation is of particular interest in the light of a recent report by Dr. Herman Amberg indicating that, in the laboratory, growth of *Sphaerotilus* could be prevented by substituting a schedule of intermittent discharges of pulp mill wastes for one of continuous discharge (6). Perhaps here too, the individual organisms composing the *Sphaerotilus* filaments were forced to leave their abode during the period of no discharge and seek their food by freely swimming about. Although I am not aware of any extensive observations on this point, the hypothesis is appealing.

We are slowly learning more of what goes on in the microworld of waste treatment. Eventually we may even be able to develop microbial systems to handle lignins and certain synthetic organics that presently pass through treatment practically unaltered in character or concentration. The success of geneticists in developing new strains of bacteria encourages use of their techniques in research. This goes much further than simply exposing the organisms to the organic chemicals, hoping they will, through hunger, learn how to use them as food. Bac-

teria can be trained. They have excellent capacity for adapting themselves, and they breed so fast that a mutant strain can quickly establish itself in the appropriate environment.

We are engaged in developing intelligent ways of getting micro-organisms to accept strange compounds as nutrients, shocking them if necessary into evolving the necessary appetite and digestive muscle to do the job efficiently. However, we have much to learn ourselves before we can, in scientific fashion, routinely mold microbial communities into smoothly functioning organizations for breaking down highly complex compounds.

Bacteria must feed on highly energized carbon and nitrogen compounds to satisfy growth and living requirements. They soon learn to relish most manmade compounds, even very complex ones. Others they reject, presumably because certain molecular structures are too hard to break up and digest. Perhaps, if research is sharp enough, we may be able to identify many of these barriers and learn how to overcome or avoid them. It is evident that we must learn more about bacterial enzyme systems, particularly how to stimulate the development of new ones.

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1. Complete dwelling facilities on one floor, including a bathroom, with that floor reached by few, if any, steps.

2. No thresholds or other tripping hazards.

3. Nonslip surfaces in hallways, bathrooms, and kitchens, to further minimize the danger of falling.

4. Handrails by all steps and inclines.

5. Adequate handgrips, capable of supporting a heavy person, by all bathtubs and toilets.

6. Adequate illumination of all steps and other potentially hazardous areas.

7. Fully automatic central heat, where climatic conditions require it.

Other features which might be present are:

1. At least one bedroom and elimination of any plan which includes use of the living room for sleeping.

2. Doors wide enough to permit moving about the dwelling in a wheelchair.

3. Windows easily operated and cleaned.

4. A bathroom large enough and so designed as to permit its use by a wheelchair patient.

Desirable features, although not always practical to obtain, would be:

1. Communication by any feasible system from the bathroom and bedroom either to an adjacent dwelling unit or any point where aid is available most of the time.

2. A floor plan and window design which permits sunlight to penetrate into the dwelling unit, especially during the winter months.

In addition to satisfactory design, a dwelling for an older person should be located:

1. Near adequate public transportation.

2. Adjacent to everyday shopping facilities.

3. Convenient to adequate medical and hospital facilities.

4. Free from major traffic hazards.

5. Away from sources of excessive noise, malodorous fumes, or smog.

6. Close to recreational facilities.

7. In a neighborhood free from serious urban blight or slums.

8. In familiar surroundings near the occupants' usual circle of friends.

Except for a small fraction of the elderly population which is institutionalized, most of the aged people in the United States either maintain their own living quarters or live with relatives or friends. The U.S. Bureau of the

Census in its census of housing in 1950 found that close to one-third of the people 65 years of age or older lived with relatives. Some of them still owned their own homes and had sons or daughters living with them, presumably to provide companionship and care. In a large proportion of cases, however, parents had moved in with their children and no longer had a home of their own.

The proportion of homeownership, some 68 percent, among this age group exceeds that of any other in the population. And in 1950, some 75 percent of the homes owned and occupied by persons 65 years of age and older were in satisfactory structural condition.

Federal Aid to Housing

In recent years far more emphasis is being placed on housing for older people in the United States. Since 1956 it has been possible for friends or relatives or even a corporation to make the down payment on a house being purchased by a person 60 years of age or older and have the mortgage insured by the Federal Housing Administration. In addition, when an elderly person, either because of age, physical condition, or financial position, is unable to qualify as an acceptable mortgage risk, it is permissible for a third party to become a co-signer of the mortgage. Loans up to \$22,500 may be insured and repaid in as long as 30 years. It is also now easier for older persons to trade their existing houses for units better suited to their retirement years, since many of them already are homeowners.

Amendments to the National Housing Act also make it easier for nonprofit organizations to finance the construction or rehabilitation of rental accommodations for the aging. Such an organization as sponsor of a rental housing project of eight units or more specifically designed for the use and occupancy of older people is eligible for FHA mortgage insurance at a maximum of \$9,000 per dwelling unit, this amount being increased to \$9,400 per unit for elevator-type structures if a nonprofit project. The mortgage may be as much as 100 percent of replacement cost, while a profit-motivated project may have a mortgage of as much as 90 percent. If the project involves

were living in institutions such as hospitals, nursing homes, homes for the aged, and the like. Other aged persons, while not institutionalized, are incapacitated by chronic illness. A survey conducted in August 1957 disclosed that 15 percent of the noninstitutionalized population aged 65 and over were unable physically and mentally to carry on major activities such as gainful employment, housework, or out-of-doors recreation. Another 42 percent, while still able to carry on major activities, were handicapped to some extent by chronic illness. (Recent figures published by the Public Health Service estimate 21 million persons over 55 years of age with chronic illness, of whom 9.5 million are limited in their activity and 2.7 million are unable to work.)

Employment and Pensions

The long-range trend in the proportion of workers among older persons has been downward. Between 1890 and 1910, the proportion of men 65 years of age and over in the labor force dropped from 68 percent to 42 percent, and by the end of 1958 it had dropped to only 35 percent. In contrast, the rates for older women in the labor force in the United States continue to rise slowly over the years. The ratio of women 65 years of age and older was less than 8 percent in 1890; it is now slightly more than 10 percent. Among men, an important reason for leaving the labor force is disability; among women, keeping house is the most frequent reason given for not working at a paying job. The increase in pension programs of one sort or another, coupled with mandatory retirement in many industries, is of growing importance.

Nine-tenths of the Nation's 65.4 million paid workers were covered by the basic national system of old-age, survivors, and disability insurance in June 1958. This broad coverage includes virtually all the gainfully employed. Major groups not covered by the basic program are certain government employees who have separate retirement systems and self-employed physicians, as well as some who work part-time or with low earnings.

Also in June 1958, 8.8 million, or three-fifths of all aged persons, were drawing benefits under

the OASDI program. The total number of the aged eligible for benefits (including those not receiving benefits because they had not yet retired) was 10.5 million, or four-fifths of all men and three-fifths of all women aged 65 or over.

The amount paid to workers is determined by past earnings, under a formula designed to give a higher proportion to low-paid workers than to those with high earnings. A recent change in the law established the maximum payment beginning in 1959 as \$116 per month for a worker alone and \$174 for a married couple in which the wife qualifies as a dependent.

In addition, the Federal Government makes grants to States for financial assistance to needy individuals and families. And other Federal-State public assistance programs aid the aged. For example, nearly one-half of the blind are 65 years of age or over; the majority of the disabled are in late middle life, with approximately one-third at least 60 years of age; and about one-tenth of the dependent children aided by such programs are living with a grandparent.

Nearly 2½ million people 65 years of age and over are now receiving old-age assistance, and about one-fourth of them are receiving assistance to supplement their insurance benefits.

Beyond the cited programs, at the close of 1957 about 23,000 American firms had pension plans covering approximately 16,800,000 persons, practically all of whom were also covered by the OASDI program. About \$1,100 million in benefits was paid to some 1,320,000 annuitants in 1957 under these private systems.

Housing

Adequate housing and living arrangements are important to people of all ages, but the living environment is of primary importance to the elderly, who are especially vulnerable to disturbing surroundings.

In individual dwellings as well as in group accommodations, healthful housing for older people depends largely upon design features which minimize accident hazards, permit easy care of the household, and supply proper size and space arrangements. It is recommended that a dwelling unit for the elderly contain the following:

field of aging. It is no less amenable to social science approaches than medicine. The amount of research by social scientists in this area is pitifully small, and we cannot expect rapid advances unless there are rapid changes.

To increase the amount and quality of research by practitioners dealing with the aged, the first step would be to record the situation, the decision or action taken, and the detailed results, so that others may have the benefit of this experience. However, this is only the first step. Very often there are opportunities where research consultants would prove helpful in establishing the investigative formula for giving results more general applicability, in setting up a research design which converts a projected change of procedure into a controlled experiment, or aiding with analysis. Whether simple or sophisticated, such research by practitioners could help fill gaps and lead to cumulative knowledge.

Retirement effects on the individual are often quite complex and sometimes contrary to accepted ideas. For example, the Cornell study of occupational retirement found no great increase in dejection, hopelessness, and dissatisfaction with life among workers who retired. Other factors obviously pertained. Those with more favorable preretirement attitudes were found to be better adjusted and less dejected. None of these relationships, however, were close.

Several criticisms may be made of what may be called the old-age-problems approach to investigating the effects of retirement. A high proportion of retirees face financial restraints, inadequate housing, and social isolation, but there is no uniform degree of impact. While we may generalize about the mass, the object of inquiry is the welfare of the individual, with all his contradictions, quirks, and idiosyncracies.

In the problems approach, there is also a tendency toward descriptive, as distinct from explanatory, research. We are ultimately interested in those factors which play a part in influencing psychological reactions to retirement. By focusing on factors common to many individuals, we may ignore the peculiar matrix of conditions in each particular case which produces a given reaction to retirement. An explanatory approach would, on the other hand, lead to investigating relationships between a

White House Conference

Aging, a tangle of physical, social, and economic strands, has summoned National, State, and local specialists to a series of sessions in preparation for a White House Conference in January 1961. Committee chairmen and members of the National Advisory Committee to the conference met with Secretary of Health, Education, and Welfare Arthur S. Flemming on July 30, 1959.

State workshops and institutes are developing individual responsibilities for the conference program. The National Leadership Training Institute, convened immediately following the University of Michigan's 12th Annual Conference on Aging, was such a session.

To date, 37 of the 50 States and the District of Columbia have applied for Federal grants from \$5,000 to \$15,000 to help finance preconference activities.

multiplicity of factors, such as preretirement attitude, and some criterion of the degree to which retirement adjustment is "successful."

If we are to evaluate preretirement programs, we must have some measure of effectiveness. What results do we expect in the individual if preparation for retirement is extremely successful? If it is not successful?

An individual's mental welfare may be viewed either negatively or positively. An example of a negative definition is adjustment, defined as the degree to which unfulfilled needs are absent. A person with extremely few needs or desires may lead a vegetative type of existence and yet be classified as well adjusted if these needs are satisfied. The limitations of such a measure should be kept in mind.

Positive mental health may be exemplified by such a measure as autonomy, defined as the degree to which the individual has strongly felt needs and is aware of them. This type of measurement avoids a definition in terms of absence of something and specifies that presence of something, namely strongly felt needs and awareness of them, is necessary to achieve a high rank on a scale of mental health. The well-adjusted yet vegetative personality would, consequently, rank low;

rehabilitation of an existing structure rather than new construction, the ratios apply to value rather than replacement cost. Projects can be in the form of elevator-type structures, row houses, or even separate dwelling units if they are grouped in a contiguous project and can be for both families and single persons. In most instances, there is a mortgage limitation of \$12,500,000 for any one project. To assist in the provision of nursing care facilities for the elderly, FHA is now also authorized to insure mortgages on proprietary nursing homes if they meet certain specified requirements of standards and services.

But there are still those who simply cannot afford to pay the current rental cost. For this group, it is now possible for single elderly persons of low income to be admitted to low-rent public housing projects. Authority is also given to the Public Housing Administration to assist local housing authorities in building new housing or remodeling existing low-rent public housing projects to provide accommodations specifically designed for older families.

In addition to Federal aid in housing the elderly, several of our States give assistance, notably New York and Massachusetts. And there is widespread interest from coast to coast in FHA nonprofit rental housing. As of June 30, 1959, there were 48 such active projects in 21 States, with mortgages running close to \$50 million and containing more than 5,600 units, sponsored in the main by church groups.

The Federally aided low-rent housing has also been gaining headway. As of June 30, 1959, there were either built or to be built 12,434 units specifically set aside for the elderly. In addition to these special units for the elderly, the Public Housing Administration estimates that better than 80,000 persons aged 65 or older are living in regular low-rent housing developments.

Benefits to the aged from the low-rent housing program are not, of course, limited to new units planned specifically for them. Fifty thousand families now residing in public housing projects are headed by persons 65 years of age or older, and many younger families include an aged person.

Experience has demonstrated that a satisfactory environment for older people requires more than comfortable living quarters. The need for interpersonal relationships does not abate with age, but rather, need for the security offered by close ties and companionship may actually increase as the individual grows older and is less capable of managing his own environment. There is considerable evidence to suggest that the homogeneity of the social structure in a housing development is even more important than good design and good location.

Viewing our present aged population and considering its prospective increase in the next quarter century, housing accommodations for the aging must be built at an accelerated rate to meet the need in the years ahead.

Retirement Research Strategy

brief There seems to be a general sparsity of interchange between social scientists and practitioners in today's research climate for studies of the aged in general and evaluation of preparation for retirement programs in particular. In spite of acknowledgment given the importance of reciprocity between research and application, we find a dearth of it in practice.

Major improvements would be to increase the number and quality of studies in this field both by social scientists and by practitioners. The burgeoning field of medical sociology is an example. Through recognition by some medical personnel that sociologists could contribute by investigating sociocultural factors associated with illness or with a variety of problems associated with medicine as a profession, opportunities have gradually opened for sociologists. These opportunities for research and teaching positions and for research grants and fellowships have stimulated the sociological profession to take a far more active interest in medical sociology. I see no major reason why a similar burgeoning cannot take place in the

Based on a paper presented by Bernard S. Phillips, assistant professor of sociology, University of Illinois.

working life expectancy to 43.0 years, and his outlook for retirement had increased to 6.5 years. In the year 2000, the length of the retirement period may well triple the 1900 figure.

The magnitude of the change which has taken place is shown in comparing source of income for persons 65 years of age and older even between 1950 and 1956:

<i>Source of income</i>	<i>Percent</i>	
	<i>1950</i>	<i>1956</i>
Total.....	100.0	100.0
Employment.....	30.8	27.7
Social insurance and related programs..	28.5	57.7
Public assistance.....	22.5	17.4
No money income or other sources.....	25.2	10.0

SOURCE: U.S. Bureau of the Census: Statistical Abstract of the United States, 1958, p. 269.

Government and private pension and retirement plans and personal savings undoubtedly are related to the fact that the older population is receiving a steadier and more dependable flow of income than ever previously achieved in the history of the industrial United States. This is not to say, however, that we have achieved a state, either in coverage or in the amount of benefits, which meets adequately the financial needs of older persons.

Rapid social change creates problems of adjustment for persons of all ages, but it poses much more difficult problems for older persons. Persons now 65 years of age and over have lived through profound technological and cultural changes. Technological innovations have frequently resulted in the obsolescence of the occupational skills providing prestige, psychological adjustment, and economic security for older persons.

Social adjustment may necessitate reconsideration of present pension plans, retirement provisions, discriminatory hiring and firing practices, and the design of flexible conditions of work, including hours and types of services for the older worker. Social adjustment may also require the revamping of government programs which, in the main, are based on traditions of "poor relief" and the meeting of dire need created by the depression during the thirties. Government maintenance of income flow for the aged is not based on a comprehensive study of the economic problems of old age but rather represents a combination of patchwork provi-

sions improvised under the pressure of severe depression and political unrest.

As our knowledge of old age and retirement and its problems has increased, we have become more aware of the need to reexamine much of what exists in the form of present policy and practice. We have become aware, among other things, of the need to reexamine the meaning of retirement itself, for certainly there is no clear-cut boundary line between the "retired" and nonretired older worker. And perhaps there should not be! We have used up to this point the lazy man's administrative device of adopting uniform, compulsory practices to deal with the extremely variable situation with which the older person is confronted as he nears the end of his work career.

Just as a variable cannot be explained by a constant in the realm of physics, so it is unlikely that variable needs can be met by a uniform program in the realm of gerontological social engineering. Compulsory retirement at an arbitrarily fixed age without regard for the productive capacity, personal desires, and psychological and social needs of the person is undoubtedly a major factor contributing to the difficulties of both personal and social adjustments to old age. Furthermore, it is becoming increasingly clear that this practice represents a huge and tragic waste of manpower and national production at all times, and especially in times of national emergency.

It would be patently absurd to abolish retirement systems or even compulsory retirement systems. But compulsory retirement could depend on criteria other than chronological age. This determination, from a personal, social, and economic standpoint, could be more sensibly based on the capacity and willingness of the person to be productive. The measurement of continued capacity to produce at older ages is admittedly difficult. It is a subject for intensive and expanded research if equitable and efficient determinations are to be made. But the problem is not insoluble.

Providing adequate employment for older workers who desire it will require significant changes in a number of attitudes and practices of management in hiring and firing. That discriminatory practices against the older worker exist is clear. That justification for such prac-

These are only examples of evaluative criteria for preretirement programs. Whatever concepts are chosen, it is vital that some measure or measures be used as criteria for the degree of success. It is all too easy to assume that a program is an effective one simply because, on the basis of intuitive judgment, its audience seems interested or enthusiastic. For a variety of reasons, such judgments are usually quite useless.

If serious evaluative efforts are undertaken, we should be prepared to stand by the results. It may very well be that most current preretirement programs do not result in any significant improvement in the lot of the retiree. It may be, for example, that the major determining factor in postretirement success has to do with personality traits developed throughout life, and that even an excellent program can add little more to the picture. Or it may be that the American value system, with its heavy emphasis on continuing occupational success, is such that it would be difficult for the retiree, no matter how well prepared, to counteract this climate of opinion.

Once criteria for evaluation are developed and careful measurements tested, the next step is to identify those factors associated with high scores. Preliminary research has shown, for example, that "felt age," or how old a person feels, is associated with adjustment among individuals 60 years of age and over. Those who feel middle aged rather than old seem better adjusted, and such an attitude successfully counteracts the shock of retirement, death of spouse, and chronological aging.

Further study has shown that individuals who feel old are more negative in a variety of attitudes. They believe that the aged should dress conservatively, that the friends of old people should be old, that interest in sex is undignified for an older person, that the aged should expect aches and pains, and that doctors treat the young better than the old, and thereby accept a low cultural evaluation of themselves through these negative attitudes. There is less tendency for this low evaluation by the individual who considers himself only middle aged.

What are some of the practical implications of such research? Examples can be found in

golden age clubs, residential areas, and hobbies for the aged, and the possible impact of advice on these matters given during preretirement programs. It is entirely conceivable that membership in golden age clubs hastens the identification of oneself as old, a factor which seems to be related to maladjustment. The establishment of segregated communities for the aged may provide the very best housing, medical, and recreational facilities, yet isolation from functions normal to a mixed community may serve to encourage older age identifications and thus prove deleterious. The value of hobbies depends on the degree they represent a genuine investment of the individual's interests.

More and better research is needed. But it will not come to pass unless something is done to change the present climate of research vis-à-vis research opportunities and closer relationship between practitioners and social scientists.

Economic Facts

brief The elderly, if they do not work productively or gainfully, are often as individuals pinched for funds, and in the mass they are an economic burden to others unless they are assured of income from past savings or social benefits. We know relatively little about the factors underlying withdrawal of older persons from the labor force. There is some evidence, however, that such withdrawal is the result more of external factors than of a voluntary desire to retire. There is much evidence that many older men would prefer to work rather than to retire and that involuntary factors, particularly compulsory retirement, account for their exodus from the labor force.

The expected period of retirement for a young man of 20 more than doubled between 1900 and 1955. In 1900, a man of 20 had a life expectancy of 42.2 years, a working life expectancy of 39.4 years, and an expected period of retirement of 2.8 years. By 1955, his life expectancy had increased to 49.5 years, his

Based on a paper presented by Philip M. Hauser, professor and chairman of the department of sociology, University of Chicago.

It is the "everything else" which we must solve.

Some say there is little, if anything, to solve. It is quite true that almost any elderly person in the United States who needs health care will get it. It is true that, if he cannot pay for it, he will get it free, either by the generosity of the one who provides the care or by the organized generosity of charity. However, it is also true that many elderly people who need care that is beyond their means delay getting it or do not seek it at all because they do not want it under humiliating circumstances.

There is no way of avoiding the fact that the aged simply cannot afford to pay the cost of health care from current income at the time of illness. Only about 40 percent have some kind of prepayment against hospital costs, most of it expensive and limited in benefits. About four-fifths of the aged attempt to assume the burden of payment out of their own resources for other than hospital care. The story written by these crisp figures is a story of self-denial, anxiety, and an undermining of life savings meant for basic necessities. There is no way to measure the amount of helpless dependency behind these figures, the destructive pressures upon relatives and family resources. Figures such as these should be matters of great concern to any society that prides itself upon the independence of its people.

For we should be concerned, not just with the fact that health care is available to anyone who needs it, but equally with the conditions under which it is dispensed. Any design for retirement, in these days, must be loomed upon a framework of dignity and independence. A major reliance upon charity is dignified neither for the recipient nor for the giver. We should be concerned also with the fact that free care, or partly free care, which places the burden of expense and noblesse oblige upon the provider of service, is a drain upon the entire community. It pinches off sources of revenue which the community's health facilities must have in order to expand, to grow, and to stand ready to meet the health care needs of all. Our voluntary hospitals, for example, cannot tolerate much longer the economic drag on expansion and proper financing that is put upon

them by the load of free and part-pay care. Under the light of this important consideration, the whole question becomes no longer one of sentiment, morality, or compassion, nor even solely one of health care for the aged, but rather a question of adequate financing for the entire community's health plant and the establishment of fertile conditions for growth in health facilities that is in pace with the march of science. More graphically, to be concerned that elderly people be covered against the cost of hospital care under terms of decency and respect is at the same time to be concerned that the hospitals be not denied necessary equipment and expansion or adequately paid personnel because the books are in the red.

The answer must be composed of several elements if it is to work, if it is to meet the needs of the aged and of the provider of hospital services.

It must cover the cost of the entire package of hospital services. Only in this way can our aged be assured of access without barrier to the services they require, not simply because they are covered for all these services but also because the hospital, adequately financed and recompensed for their care, is able to furnish the services. Service benefits make the elderly patient a full-pay patient, a status that yields a harvest of therapy to his own self-esteem, his medical and psychological needs, and the economic health of the hospital. Indemnities, on the other hand, maintain him in a state of dependency as a part-pay patient and maintain the hospital as a "part-collect" agency writing its records in red ink, a condition not good for either. For the needs of both patient and hospital, it is often debatable whether or not part-pay status is any real improvement over no pay.

The service benefit approach is especially suited to the needs of the aged, whose admissions are characterized by prolonged and frequent use of the broadest possible scope of hospital services and facilities. It makes possible an approach to the question of prudent cost that works not within the realm of financial deterrents to use, but rather as a more rationalized and economic use of an even broader range of hospital services covered under prepayment. Services and practices

tices exists, in terms of productivity of the older worker, his skill, or his dependability, is not so clear. Such evidence as is available suggests, on the contrary, that the older worker who is not afflicted with definite physical impairments or chronic disorders which handicap him more than holds his own with younger workers in many types of occupations and industry. Many of the discriminatory hiring and firing practices appear to stem from superstitions rather than from economic and factual considerations. Here again there is a great need for effective research to provide a factual basis for evaluation of the productivity and the economic contribution of the older worker and to point up the specific occupations and industries in which he can be utilized most effectively.

In general there can be little doubt that we have the capacity to deal with the economic problems of old age. Our productivity and our expanding economy can unquestionably meet the demands represented by the requirements of older persons as well as those of other claimant groups. The question is not one of determining whether we can afford the maintenance of an older population, a large proportion of which can, in fact, maintain itself if given the opportunity to do so. Our problem is rather one of determining most effectively how to utilize our human as well as other resources to assure not only subsistence but the good life for all. We have in a major way succeeded in adding years to life; we are still only scratching the surface of the task of adding life to years.

Health Care

brief The problem of providing health care to the aged has been stated succinctly in the opening chapter of a recent report of the U.S. Department of Health, Education, and Welfare: "How can higher than average medical needs be financed out of lower than average financial resources?"

Based on a paper presented by Basil C. MacLean, M.D., M.P.H., president of the Blue Cross Association.

Unfortunately the question lends itself more easily to simple definition than to simple solution. Were the question directed to some uncomplicated primitive societies, it could be answered directly by a few basically human manifestations of compassion, love, generosity, and respect for age, an answer made even simpler by the few, if any, medical resources available. There are, of course, opposite human reactions by other primitive groups who discard at the side of the trail those of their number who can maintain no longer the productivity of health and youth.

For the problem is ultimately a moral one, regardless of the level of society in which it is posed. The answer to it is, for many, a valid yardstick of the worth of any society, simple or complicated. How do we treat and assess our older citizens? Do we discard them at the side of the trail or do we make the golden years a clear recognition of service performed and rewards deserved? And do the terms of that recognition afford dignity, independence, and respect for its recipients?

This is not the only great social question of our time that, when everything else is stripped away, stands revealed as a simple morality. It is useful, from time to time, to see these questions so, in order to maintain our bearings and to remind ourselves of our ultimate goal. Yet we must return again, however reluctantly, to that "everything else" which we so casually stripped away, because this is the meat of the matter in our immensely complicated world.

"Everything else" is the entire framework of our society, its traditions, laws, and customs as they have evolved and elaborated themselves. "Everything else" is usually a matter of money. Personal compassion may be expressed by a word or a gesture, but social compassion obligates people to subdue their differing definitions of the emotion and find a way to allocate the necessary funds for the compromise. It is easy enough to find a moral position on providing health care to our aged, but it is not so easy to find workable ways of making funds available and distributing these funds through the channels of communication, exchange, vested interests, and intensely differing opinions that offer themselves for use.

only by inactivity. And our economy and community standard of living will be seriously threatened by responsibility for their care.

We are past the time when we can debate whether we can afford to supply maximum rehabilitative services within our general hospital program. Rather, our question is how much longer can we afford not to. To the individual patient, it means rehabilitative services immediately following an accident or disabling illness and early restoration to the most active life consistent with his residual capacities without a long interval which permits the physi-

cal disability to progress or the patient to develop resistance toward rehabilitative efforts. To the community, restoration of every disabled person to the most useful existence possible, whether returned to a job or simply trained for maximum self-care, means a corresponding decrease in the responsibilities of the productive members of the population. To the general hospital, rehabilitative service means a more dynamic medical program, spreading through all departments and creating more interest in the diminution of long-term patient disability and an earlier release of hospital beds.

Health Manpower Outlook

The ratio of physicians to population in the United States, which has ranged between 131 and 135 per 100,000 persons for 20 years, will drop to 126 per 100,000 by 1975 unless the rate of graduating students increases substantially, according to the latest in a series of health manpower reports issued by the Public Health Service. The number of dentists per 100,000 persons in the population is expected to decline even more sharply.

Entitled "Health Manpower Source Book, Section 9: Physicians, Dentists, Nurses," the report reveals trends in the education, location, and specialization of these professional personnel.

In the academic year 1958-59, the 85 medical schools in the United States graduated 6,895 physicians. To maintain the present physician-population ratio, our medical schools would need to graduate about 10,360 students in 1975, nearly 3,000 above the 7,410 graduates currently predicted for that year.

The 47 dental schools in the United States graduated 3,083 dentists in the academic year 1957-58. Despite the addition of eight new dental schools since World War II and large increases in the number of graduates, the ratio of dentists to population remains below pre-World War II levels. To regain the current dentist-population ratio, about 2,700 more dental graduates above the number currently predicted will be needed in 1975. This calls for a 75 percent increase in the number of den-

tal students who, according to present estimates, will be graduated during that year.

According to the report, the ratio of dentists was 62 per 100,000 people in 1940 and 57 in 1958, and is expected to decline to about 50 per 100,000 in 1975. There should, however, be an increase in the ratio of professional nurses, from 268 per 100,000 population in 1958 to 284 per 100,000 in 1970.

The nurse-population ratio has increased almost fivefold in the United States since 1910. In the academic year 1957-58, the 1,145 schools of nursing in the United States enrolled about 113,000 students and graduated 30,410 nurses. Admissions to these schools are expected to increase in the next decade, and annual graduations of up to 37,000 students are predicted by 1965.

The current combined ratio of doctors of medicine and osteopathy to population is about 140 per 100,000 persons. This is expected to decline to 133 per 100,000 by 1975. To maintain the current ratio, about 11,000 graduates a year from the Nation's schools of medicine and osteopathy will be needed in 1975, an increase of slightly more than 3,000 above the number expected for that year on the basis of present estimates.

The report contains State and regional as well as national data. It was prepared by the Service's Division of Public Health Methods, in cooperation with the Divisions of Dental Resources and Nursing Resources.

appropriate to geriatric care can be developed which take the prepayment dollar a longer way. Expanded hospital outpatient services, home nursing, and nursing homes are but a few of these.

It is essential, as it is with other elements of retirement security, that the cost of such coverage be distributed, at least in part, over the working years. In short, the cost must be rationalized through the proved method of prepayment.

The pooling of risk and the distribution of cost must be done on some basis if cost of care for the aged is to be within reach. The public is moving toward a major policy decision on how to strengthen prepayment financing for aged citizens. The task can be done through the medium of proved and experienced voluntary prepayment plans if augmented by governmental resources as may be needed.

The opening question, "How can higher than average medical needs be financed out of lower than average financial resources," can only be answered by, "They cannot." They can be financed only through a pooling of the community's financial resources, a fact which is becoming increasingly apparent. The methods and media through which these resources will be organized, allocated, and dispensed are not yet fully chosen and committed, but are still evolving.

Rehabilitation

brief A high proportion of all illness is caused by chronic diseases, and a significant majority of all hospital beds in the United States are occupied by patients suffering from strokes, arthritis, neurological disorders such as Parkinson's disease, cerebral palsy, paraplegia, and the like, civilian accidents, industrial accidents, and other chronic disabling conditions.

Based on a paper presented by Max Karl Newman, M.D., director, Detroit Institute of Physical Medicine and Rehabilitation, and director of the department of physical medicine and rehabilitation of Carmel Hall, Detroit Memorial Hospital, Sinai Hospital, and the Jewish Home for the Aged, Detroit, Mich.

To combat and control chronic diseases, and the illness and disability that result from them, the full force of modern medicine and almost the entire range of medical and specialized services, equipment, and physical facilities are needed. Until more knowledge is gained of primary prevention of chronic diseases in children, adults, and the aged, restorative or rehabilitative medicine is needed. If it were to be provided adequately in the State of Michigan alone, however, 23 rehabilitation centers distributed throughout the State, costing from \$1 to \$3 million per institution, would be required, exclusive of the salaries of personnel numbering into the hundreds.

In this obvious impossibility, the rehabilitative service can and should be located in a general hospital as is now being done at Detroit Memorial Hospital and Sinai Hospital in the city of Detroit. Advantages of location in a general hospital are ready availability of all types of medical specialists and consultants, access to both inpatient and outpatient care, lack of duplication of certain types of facilities, possible earlier referral of the patient, better dissemination of knowledge concerning rehabilitation, wider uses of the rehabilitation principle in patient care, and total medical and surgical service.

To the uninitiated, a restorative and rehabilitative medicine program uses physical and occupational therapy under the direction of a physiatrist (the specialist in the field of physical medicine and rehabilitation) on the patient with chronic disability, such as stroke, arthritis, or a surgically repaired bone not being properly used by the patient. Psychological and social services are then added and, as the patient progresses, a State agency gives vocational counseling, testing, and job training, or ways and means of functioning to the maximum capacity despite the disability are supplied.

Many of the disabled added each year to our population could benefit by restorative or rehabilitative medicine and they can be treated early in the general hospital. If this is not done, we shall be overwhelmed in the not too distant future with a backlog of infirm and disabled old and young persons, deprived of their earlier potentialities for rehabilitation. Our medical resources will have failed these people

However, diet is only one of the factors in atherosclerosis. Some others being studied singly and in combinations are sex, age, race, physical exercise, heredity, and stress. Until we learn more, it is impossible to pinpoint the one determining factor—dietary, physical, or environmental.

The current, widespread practice is to prescribe a modified diet on the theory that it will be beneficial to the patient with a certain heart disease.

Diet therapy in heart disease, except for a few treatments of established value, is constantly changing, partly because of new findings. It is important to establish the possible benefits of each discovery to patients with cardiovascular disease.

Because of the need for information and diet guides on fat selective and fat restrictive therapy, the American Heart Association and the American Medical Association are preparing such material for the use of physicians. Its purpose is to explain the current situation and what can be expected of this type of diet therapy with the knowledge that these prescribed diets will do no harm and that they may do some good.

However, the patient's adherence to the diet regimen is the final test. Diet therapy, for the most part, is a do-it-yourself project. It is the patient himself, or the person caring for him, who must understand and follow through on a diet.

One of the biggest blocks to a successful dietary regimen is the patient's lack of sufficient instructions when the diet is prescribed. If the patient is to derive the expected benefits, he must know what changes are required and how to make them accurately for each meal as long as he is on the prescribed diet.

When the physician prescribes a diet modification, it is his responsibility to initiate the patient's diet education and, as necessary, refer him to a diet counselor (nurse, dietitian, or nutritionist) for supplementary assistance. Few physicians can take the time to do more than explain the principles of the diet and give the patient standard diet references. But rarely can adequate instructions be given or learned in one quick lesson.

Counseling Services

The majority of patients on prescribed diets lack the adequate counseling services which they should have. I exclude patients who are referred periodically during treatment by their physicians to dietitians or nurses for dietary guidance, patients attending clinics where dietary counseling is an integrated patient-care service, and hospitalized and institutionalized patients. I am concerned about the patients who, for the most part, have had only one instruction session, generally at the time the diet was prescribed. These patients are living at home and working.

Regardless of age or education, the average person does not have sufficient knowledge to fulfill accurately the requirements of most diet prescriptions. He is deluged by new and strange duties and rules. Perhaps he must learn the names and meanings of such unfamiliar nutrients as fatty acids, sodium, polyunsaturated fats, and cholesterol, and how to measure them in units, exchanges, grams, or milligrams. He needs explanations and guidance as each new need arises. When these services are provided adequately, he can follow a diet correctly.

However, even with close guidance by physician and diet counselor, it is not always easy for the patient to master the many details of his diet. To persist in meticulous daily application of his new dietary regulations demands both interest and ability.

Patients are often told to "cut down," "cut out," or "go easy" on salt, starches, or fats. Many persons disregard such advice and continue on their way, unworried. Others are convinced, however, that the prescription is essential to their health. They seek any source of help. They spend time and money and often become confused and unduly worried because the physician said, "Watch your calories."

This picture is not exaggerated. Every day numerous inquiries about prescribed diets find their way to pharmacists, government agencies, librarians, Congressmen, and even to charlatans and special food stores. Requests for help range from questions about sodium restriction to the meaning of hydrogenated and unsatu-

Diet Care and Services for Patients With Cardiovascular Disease

BETH HEAP

AS INVESTIGATORS seek the causative and preventive factors in heart disease, the public is demanding information on how to apply findings in heart research to patterns of daily living. Articles, books, and radio and television programs have supplied information, and health agencies have held open meetings, particularly on the subject of obesity and cardiovascular disease, in an effort to meet this demand. Recently the American Heart Association and the National Heart Institute presented a summary entitled "A Decade of Progress Against Cardiovascular Disease" (1).

Although diet as therapy seems to be increasing in importance, especially in the prevention and control of atherosclerosis, it is only one interrelated factor in the medical care regimen.

Status of Diet Therapy

Briefly, current diet therapy in cardiovascular disease emphasizes (a) calorie restriction to achieve and maintain correct weight, (b) sodium restriction to control the edema which often accompanies congestive heart failure and to lower blood pressure in some cases of hypertension, and (c) selection and restriction of fats as a possible factor in the treatment and prevention of atherosclerosis.

Obesity, or even relatively mild overweight,

is considered a hazard to patients with heart disease, and weight reduction is generally the physician's first order for overweight cardiac patients. Physicians vary in their methods for treating obesity, but they agree as to its danger to health, especially in heart disease. Generally, they also agree that patients should continue on an adequate diet, and when specific modifications are necessary, they should be made only on the physician's recommendations.

Sodium restriction is the established diet therapy in the treatment and control of the edema accompanying congestive heart failure. Physicians prescribe diets of designated levels of sodium according to the individual patient's needs. In some cases of hypertension, sodium restriction helps to lower blood pressure.

Sodium-restricted diets are also prescribed for the prevention of edema when treatment includes the use of such medications as adrenal steroids which have sodium-retentive properties and cause excessive fluid accumulation in the tissues.

At present there is no established dietary treatment for atherosclerosis. Current studies indicate several important facts that relate dietary fat to the level of blood cholesterol. Increasing evidence points to the importance of the ratio of saturated to polyunsaturated fats in the diet in altering serum cholesterol. Metabolism studies indicate that polyunsaturated fats in the diet usually reduce the serum cholesterol and increase the cholesterol and cholic acid in the feces. Serum cholesterol concentration is a good indication of the total lipid concentration, but its true relation to coronary artery disease is still undetermined.

Miss Heap is chief nutrition consultant, Heart Disease Control Branch, Division of Special Health Services, Public Health Service. The article is based on a paper given at the Annual Health Conference of the Pennsylvania Department of Health, held at University Park, August 18, 1959.

Hospitals and Nursing Homes in the United States, 1959

LESLIE MORGAN ABBE, B.S.

This report brings up to 1959 the general review of hospital beds in the United States published in Public Health Reports, May 1955, pp. 484-491. It includes for the first time inventories and programs of skilled nursing homes under the Federal grant-in-aid (Hill-Burton) program.

IN THE YEARS since World War II good health has become popular. People generally know that the modern skills in health care have greatly improved, and that the resources for treatment and prevention are an important part of their personal needs. This awareness has led to broad public support for the major outlays needed to build hospitals, clinics, nursing homes, and rehabilitation centers. Gains in the postwar period have been impressive for some of our health resources, while losses have occurred in others. The new forms of therapy, together with changing characteristics of our population as a whole, pose new needs hardly imagined a generation ago.

This report reviews national trends and net gains in health facilities in the United States in the last 10 years and it provides a look ahead. It is based on the series of comprehensive plans for hospital and medical facilities developed by the States under title VI of the Public Health Service Act. Hospital data are now available on a comparable reporting basis for 12 years, from 1948 through 1959. Data for skilled nursing homes are available only since 1957, but such record is considered to be reasonably com-

prehensive. Inventories in these plans reflect designed capacities, rather than present bed complements. The State plans include long-range programs for additional bed needs. Another, more limited, approach to the future is also described in this paper, with specific goals for health facilities in the next decade, as developed recently by the Public Health Service.

The State plans provide data on all facilities open to civilians, with the exception of Federal hospitals of the Veterans Administration and the Public Health Service. They report all hospitals according to the four principal categories of service provided: general, mental, chronic, and tuberculosis. They also include skilled nursing homes and a variety of facilities confined entirely or principally to outpatient care, such as public health centers, diagnostic and treatment centers (both as outpatient departments of hospitals and as independent clinics), and rehabilitation centers. This report deals only with inpatient facilities.

At the beginning of January 1959, according to the State plans, the Nation had 1,322,000 hospital beds and 245,000 beds in nursing homes which provide skilled nursing care. Not all these beds, however, are acceptable for long-range planning purposes. On the basis of fire and health hazards, 168,000 hospital beds and 112,000 nursing home beds are classified as nonacceptable.

Data for each State and Territory are shown in tables 1 and 2. For easy comparison, the States are grouped by the broad socioeconomic regions of the United States. Federal beds for civilians are not included in these figures. They comprise 126,000 beds in hospitals of the

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rated fat. These requests make it clear that patients are interested in learning what their diets mean and how to carry them out.

Printed as well as oral instructions should always be a part of any prescribed diet. Standard diet references are a tool designed to help the patient help himself. Three sodium-restricted diet booklets (2) are the most recent patient education references. However, any diet pamphlet is standard only while on the shelf. Little attention or space can be devoted in standard guides to individual problems such as limited education, inadequate income, or lack of interest. And it is in solving these difficulties that individual counseling is of the greatest benefit.

A patient is justified in expecting adequate dietary instructions, just as he expects the services of a pharmacist for his drugs, of a nurse for his injections, and of a physical therapist for his exercises. Yet today only a small percentage of patients have the opportunity to obtain dietary counseling. The question is how can more of these services be developed.

There are several ways, but few of them have been explored, and few have been successful. Perhaps the most practical would be a cooperative community service designed to serve all patients on their physicians' referral. Such a service would assure physicians that their patients would receive sound dietary instruction supported by recommended diet guides or manuals. The patient would be better prepared to shoulder his diet therapy responsibilities, and the community would be one step higher on the ladder of improved health services.

Although there is a dearth of counseling services, recognition is growing that adequate diet education is essential for more effective diet therapy and for the development of sound nutrition practices in the general population.

Among the many diet pamphlets particularly helpful to persons who are not on prescribed diets are three basic guides. "Food for Fitness: A Daily Food Guide" is designed for all ages (3). "The Food You Eat and Heart Disease" summarizes current knowledge about diet and cardiovascular disease (4). "Food Guide for Older Folks" includes pointers on planning, buying, and preparation of food and recom-

mendations for adjustment of calories as energy and maintenance needs decrease (5).

Future Activities

For the future, I visualize nutrition education activities which will encompass the presumably healthy adult population as well as those under medical treatment. On the premise that the earlier one starts to achieve and maintain maximum nutritional health, the better the results, the development of two new nutrition education activities seems advisable.

The first is a sound nutrition course for all high school students. Its primary aim would be to teach students the relation of adequate diet to good nutritional health. Most young people, particularly boys, leave high school and soon accept family responsibilities with the scantiest understanding of this fundamental subject.

Second, I envision a community dietary counseling service available to anyone who requests nutrition information. This same service would also be available on referral by a physician to any patient on a prescribed diet. Such a service would be one more means of helping to prevent as well as to correct nutritional disorders.

A community dietary counseling service will achieve effectiveness only when it is initiated, directed, and used consistently by members of local medical societies in cooperation with other community health groups.

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- (5) U.S. Department of Agriculture: Food guide for older folks. Home and Garden Bull. No. 17. Washington, D.C., U.S. Government Printing Office, 1959, 16 pp.

Veterans Administration, 6,500 beds in hospitals operated by the Public Health Service for merchant seamen and others, and about 1,200 beds in Indian hospitals.

Postwar Construction and Net Gains

During World War II and for most of the depression decade preceding the war, hospital construction was curtailed, piling up a serious backlog of need. After the war when money, men, and materials became available for peacetime development, a great upturn in hospital construction took place. This was stimulated by Federal assistance provided by the Hospital Survey and Construction Act of 1946 (now referred to, with its amendments, as title VI of

the Public Health Service Act). In this period, too, a large increase occurred in construction of new Federal hospitals for the Veterans Administration. As shown in figure 1, total hospital construction reached a peak of more than \$5 per capita in 1951, dropping to a little more than one-half this level in 1956. Thereafter, another marked upturn took place, largely as a result of increased Federal support. A further rise is predictable through 1960 on the basis of Federal funds now appropriated. Figure 1 is based on constant prices, thus discounting the marked increase in construction costs, amounting to 44 percent, which has occurred since 1947-49. In current dollars, the 1958 volume of \$1,011 million exceeded the previous alltime peak of \$947 million in 1951.

Table 2. Existing beds in skilled nursing homes in the United States and Territories, January 1, 1959

State and socioeconomic region	Skilled nursing home beds		State and socioeconomic region	Skilled nursing home beds	
	Acceptable	Nonacceptable		Acceptable	Nonacceptable
United States ¹	133, 016	112, 815	Central	34, 048	56, 720
New England	7, 347	20, 574	Illinois	3, 881	19, 631
Connecticut	3, 943	2, 544	Indiana	342	8, 262
Maine	0	1, 211	Iowa	2, 082	14, 791
Massachusetts	409	14, 544	Michigan	4, 112	4, 366
New Hampshire	581	1, 450	Minnesota	7, 013	2, 462
Rhode Island	2, 195	0	Missouri	3, 957	0
Vermont	219	825	Ohio	8, 770	5, 839
Middle East	30, 037	10, 850	Wisconsin	3, 891	1, 369
Delaware	121	0	Northwest	5, 722	5, 263
District of Columbia	1, 026	22	Colorado	989	2, 953
Maryland	1, 297	2, 445	Idaho	698	469
New Jersey	8, 068	0	Kansas	162	233
New York	12, 222	4, 316	Montana	794	199
Pennsylvania	5, 528	4, 058	Nebraska	443	638
West Virginia	1, 775	9	North Dakota	523	231
Southeast	19, 099	5, 235	South Dakota	431	249
Alabama	515	381	Utah	1, 553	0
Arkansas	1, 216	1, 314	Wyoming	129	291
Florida	3, 629	1, 309	Far West	28, 170	10, 918
Georgia	2, 311	511	Alaska	84	15
Kentucky	1, 396	168	California	17, 689	3, 797
Louisiana	3, 393	0	Nevada	296	48
Mississippi	580	347	Oregon	2, 339	3, 048
North Carolina	315	63	Washington	7, 762	4, 010
South Carolina	493	576	Territories	225	237
Tennessee	1, 233	566	Guam	0	0
Virginia	4, 018	0	Hawaii	138	200
Southwest	8, 368	3, 018	Puerto Rico	87	37
Arizona	425	70	Virgin Islands	0	0
New Mexico	541	47			
Oklahoma	1, 997	421			
Texas	5, 405	2, 480			

¹ Includes Territories.

Source: State plans, approved under title VI of the Public Health Service Act.

Table 1. Existing civilian hospital beds¹ in the United States and Territories, by service category, January 1, 1959

State and socioeconomic region	General		Mental		Chronic		Tuberculosis	
	Acceptable	Nonacceptable	Acceptable	Nonacceptable	Acceptable	Nonacceptable	Acceptable	Nonacceptable
United States ²	587, 318	65, 764	445, 009	88, 578	44, 461	6, 622	76, 685	7, 760
New England.....	32, 312	7, 339	34, 435	5, 579	5, 401	3, 018	3, 986	1, 100
Connecticut.....	8, 321	261	8, 905	145	1, 441	0	727	0
Maine.....	2, 439	1, 306	2, 768	25	65	106	196	254
Massachusetts.....	15, 364	5, 165	16, 408	4, 147	2, 727	2, 912	2, 405	703
New Hampshire.....	2, 056	176	2, 180	120	0	0	87	0
Rhode Island.....	2, 883	12	3, 258	0	1, 168	0	571	0
Vermont.....	1, 249	419	916	1, 142	0	0	0	143
Middle East.....	138, 299	16, 868	126, 944	36, 709	15, 750	873	15, 751	3, 720
Delaware.....	1, 676	50	1, 000	645	750	142	223	0
District of Columbia.....	4, 286	264	5, 979	0	136	0	870	0
Maryland.....	8, 361	141	8, 653	144	2, 541	0	1, 644	0
New Jersey.....	16, 705	1, 197	19, 181	1, 046	345	0	2, 752	110
New York.....	59, 985	8, 887	61, 267	22, 169	6, 778	77	6, 270	2, 534
Pennsylvania.....	40, 259	5, 136	26, 736	12, 705	4, 445	654	2, 982	1, 076
West Virginia.....	7, 024	1, 193	4, 128	0	755	0	1, 010	0
Southeast.....	108, 466	10, 631	75, 861	18, 206	5, 482	189	17, 146	303
Alabama.....	9, 525	393	3, 861	3, 815	160	0	1, 147	22
Arkansas.....	5, 614	847	2, 760	1, 726	192	0	1, 653	0
Florida.....	12, 522	1, 613	11, 984	264	753	15	2, 169	0
Georgia.....	12, 062	1, 264	11, 528	0	505	30	2, 088	0
Kentucky.....	9, 192	533	7, 232	115	449	0	1, 355	0
Louisiana.....	11, 048	770	7, 894	94	441	0	1, 642	0
Mississippi.....	5, 975	1, 461	4, 047	1, 894	140	25	650	0
North Carolina.....	14, 578	1, 476	12, 482	0	547	47	2, 246	0
South Carolina.....	5, 745	1, 383	2, 079	2, 502	71	0	877	140
Tennessee.....	10, 497	1, 515	6, 558	3, 111	1, 632	72	1, 574	141
Virginia.....	11, 708	346	5, 436	4, 685	592	0	1, 745	0
Southwest.....	44, 523	4, 225	24, 877	966	1, 942	84	6, 485	209
Arizona.....	3, 716	529	1, 529	0	211	0	722	115
New Mexico.....	2, 600	355	1, 279	0	321	6	330	74
Oklahoma.....	9, 436	348	8, 137	0	591	0	947	0
Texas.....	28, 771	2, 993	13, 932	966	819	78	4, 486	20
Central.....	159, 937	15, 316	102, 166	20, 246	10, 012	2, 006	18, 823	1, 340
Illinois.....	33, 590	4, 051	21, 363	7, 055	2, 944	205	4, 621	0
Indiana.....	11, 521	2, 558	6, 402	2, 856	520	150	1, 055	467
Iowa.....	10, 694	1, 052	3, 979	1, 639	1, 150	75	476	14
Michigan.....	24, 344	3, 878	14, 397	6, 596	676	0	4, 472	121
Minnesota.....	14, 132	861	9, 807	365	597	0	1, 495	0
Missouri.....	17, 303	1, 267	10, 758	120	1, 480	775	1, 682	0
Ohio.....	32, 158	1, 297	23, 532	224	1, 531	792	3, 633	618
Wisconsin.....	16, 195	352	11, 928	1, 391	1, 114	9	1, 389	120
Northwest.....	34, 248	5, 796	20, 699	5, 469	1, 347	0	2, 452	353
Colorado.....	5, 657	1, 670	3, 527	2, 903	52	0	806	154
Idaho.....	1, 374	1, 124	1, 036	20	37	0	50	35
Kansas.....	8, 597	785	3, 221	2, 498	240	0	522	20
Montana.....	3, 344	243	1, 906	0	196	0	285	0
Nebraska.....	6, 116	405	5, 256	48	303	0	221	0
North Dakota.....	2, 904	295	1, 829	0	76	0	300	0
South Dakota.....	2, 710	497	1, 669	0	42	0	118	144
Utah.....	2, 184	589	1, 483	0	386	0	100	0
Wyoming.....	1, 362	188	772	0	15	0	50	0
Far West.....	61, 782	5, 198	55, 922	1, 363	3, 788	20	8, 226	718
Alaska.....	641	355	18	0	0	0	475	299
California.....	47, 016	2, 070	44, 757	296	3, 129	0	5, 774	354
Nevada.....	785	158	580	0	20	0	36	23
Oregon.....	5, 474	1, 360	4, 243	70	349	20	500	42
Washington.....	7, 866	1, 255	6, 324	997	290	0	1, 441	0
Territories.....	7, 751	391	4, 105	40	739	432	3, 816	17
Guam.....	161	0	0	0	0	0	160	0
Hawaii.....	1, 758	391	928	40	353	396	949	0
Puerto Rico.....	5, 698	0	3, 151	0	386	36	2, 677	17
Virgin Islands.....	134	0	26	0	0	0	30	0

² Includes Territories.

¹ Excluding Federal facilities.

SOURCE: State plans, approved under title VI of the Public Health Service Act.

Table 3. Trends in total civilian beds for inpatient care,¹ United States and Territories, 1948-59

Year (January 1)	Total beds needed ²	Existing beds					Additional beds needed	
		Total	Acceptable			Nonac- ceptable	Number	Rate per 1,000 pop- ulation
			Number	Rate per 1,000 pop- ulation	Percent of total need			
	Total beds for inpatient care ³							
1956 ⁴ -----	2, 012, 179	1, 407, 375	1, 180, 135	7. 29	58. 6	227, 240	1, 039, 628	6. 42
1957-----	2, 399, 060	1, 505, 034	1, 219, 885	7. 43	50. 8	285, 149	1, 184, 245	7. 21
1958-----	2, 441, 726	1, 521, 267	1, 238, 188	7. 36	50. 6	283, 079	1, 211, 141	7. 20
1959-----	2, 412, 802	1, 568, 028	1, 286, 489	7. 52	53. 3	281, 539	1, 119, 165	6. 54
	Total hospital beds							
1948-----	1, 776, 401	1, 016, 712	867, 960	6. 28	48. 9	148, 752	908, 441	6. 57
1949-----	1, 776, 673	1, 025, 179	879, 872	6. 30	49. 5	145, 307	896, 801	6. 42
1950-----	1, 850, 052	1, 118, 535	952, 196	6. 49	51. 5	166, 339	897, 856	6. 12
1951-----	1, 883, 487	1, 185, 480	1, 009, 918	6. 78	53. 6	175, 562	873, 569	5. 87
1952-----	1, 899, 806	1, 193, 836	1, 017, 823	6. 71	53. 6	176, 013	881, 983	5. 81
1953-----	1, 899, 279	1, 218, 781	1, 057, 427	6. 90	55. 7	161, 354	848, 567	5. 54
1954-----	1, 887, 372	1, 242, 087	1, 083, 056	7. 00	57. 4	159, 031	812, 765	5. 25
1955-----	1, 926, 600	1, 275, 072	1, 098, 815	6. 93	57. 0	176, 257	838, 745	5. 29
1956-----	1, 960, 410	1, 279, 050	1, 117, 933	6. 91	57. 0	161, 117	850, 061	5. 25
1957-----	1, 985, 354	1, 287, 051	1, 106, 991	6. 74	55. 8	180, 060	883, 433	5. 38
1958-----	2, 009, 040	1, 299, 832	1, 125, 169	6. 69	56. 0	174, 663	888, 474	5. 28
1959-----	2, 027, 750	1, 322, 197	1, 153, 473	6. 74	56. 9	168, 724	867, 129	5. 07
	Nursing home beds (skilled care) ³							
1956 ⁴ -----	251, 769	128, 325	62, 202	0. 60	24. 7	66, 123	189, 567	1. 84
1957-----	413, 706	217, 983	112, 894	. 69	27. 3	105, 089	300, 812	1. 83
1958-----	435, 686	221, 435	113, 019	. 67	25. 9	108, 416	322, 667	1. 92
1959-----	385, 052	245, 831	133, 016	. 78	34. 5	112, 815	252, 036	1. 47

¹ Excluding Federal facilities.² As limited by title VI of the Public Health Service Act and State programing thereunder. For some types of service, some States now have beds in excess of these measures of need.³ No data reported for nursing homes for 1948-55.⁴ Preliminary report for nursing homes, from 34 States.

Source: State plans, approved under title VI of the Public Health Service Act.

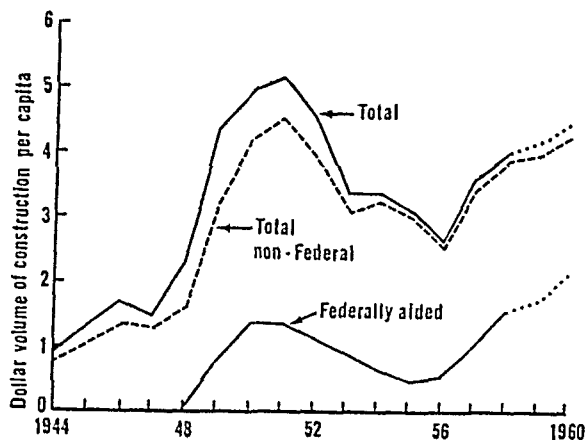
population. In this context it is useful to analyze specific levels of actual programing in each State. The additional construction definitely planned at identified sites is found, upon study, to be strongly related to the level of average income in a State, as well as to the level of acceptable beds now available.

Figure 3 shows the trend of beds now available and those programed in relation to income level for three main classes of care: short-term care in general hospitals, long-term care in chronic hospitals and nursing homes, and care in mental hospitals. The charts reflect a sum-

mary of trends found in scatter diagrams prepared from data for all the States and must not be taken as an exact pattern for all States. They show a marked tendency at all incomes for States to program at a constant level above that of the acceptable beds available, rather than to a uniform standard of need. This is particularly true for mental hospitals.

It appears that the short-term plan of most States reflects official judgment on feasible advances for the near future. This may be entirely realistic, as against arbitrary standards of long-range need. The Public Health Service

Figure 1. Value of all hospital construction in the United States and Territories, at constant prices, 1944-60



Trends in the Nation's total civilian resources for inpatient care appear in table 3, together with rates of availability per 1,000 population and of additional need, as recorded in the State plans. An expanding population and mounting obsolescence have offset new construction to a marked degree, so that from 1948 to 1959 the increase of 306,000 beds for all hospital purposes has resulted in a gain of less than 0.5 bed per 1,000 population for acceptable facilities. There are now 20,000 more nonacceptable beds in hospitals than were reported initially in 1948. Also, nearly one-half of the nursing home beds failed to meet current standards.

An elaboration of table 3 is presented in table 4 to show annual trends by type of service provided. In rates per 1,000 population, this record displays substantial progress for general hospitals, a small gain and subsequent decline in mental hospital beds, a rise and decline in tuberculosis beds, and a slow growth in chronic hospital beds. Every category has increased in the actual number of acceptable beds.

The distribution by State of the net gain in total beds available in the decade 1949-59 shows substantial variation (fig. 2). States with rapid population growth increased their total beds much more rapidly than States of little or no growth. This relation applies both to percentage increase and to the quantitative increase expressed as gain in beds per 1,000 of the population living in the State during the base year 1949. The net gain in beds per 1,000 pop-

ulation is not related to State income levels; the general trend for all States shows a gain of about 2 beds per 1,000 of the base year population at all income levels. However, percentage gains were much higher in low-income States, where the initial level of availability was low.

Local circumstances have produced occasional wide departures from the trend. Still, the broad pattern of relationship between net gains, income levels, and rate of population growth provides a new dimension of understanding and prediction. It is encouraging to find that net gains are related to population growth and that they are largely commensurate with it. Study has shown that the gains in the low-income States are predominantly the result of the Federal assistance (Hill-Burton) construction program. It must be noted that this analysis of net gains in the 1949-59 decade relates to total existing beds for all categories of hospitals. Throughout this period between 8 percent and 9 percent of these beds have been deemed obsolete and needing replacement.

Additional Needs

Basic standards of need developed in the State plans have undergone gradual changes since 1948, as shown by the data on acceptable beds and additional beds needed in table 3. From 1948 to 1959 the total need for hospital beds reported decreased from 12.8 beds per 1,000 population to 11.8. This decrease is two-thirds of the net decrease in additional need reported.

Historical data on need by single categories appear in table 4. The need for additional general hospital beds has been reduced nearly one-half, and the need for more tuberculosis beds, on a nationwide basis, reduced drastically (from 0.61 to 0.11 bed per 1,000 population) because of diminishing incidence of new cases. The States have continued to use a presumptive standard of need for mental hospitals of 5 beds per 1,000 population. According to this measure, construction of mental hospitals has not kept pace with population growth, with the result that there is a net increase in additional need of 0.17 bed per 1,000 population.

There is prospect of a long-continued backlog of needed construction, to judge by the historical trend of slow overall gain in beds per 1,000

Table 4. Trends in civilian hospital beds,¹ by type of service, United States and Territories, 1948-59

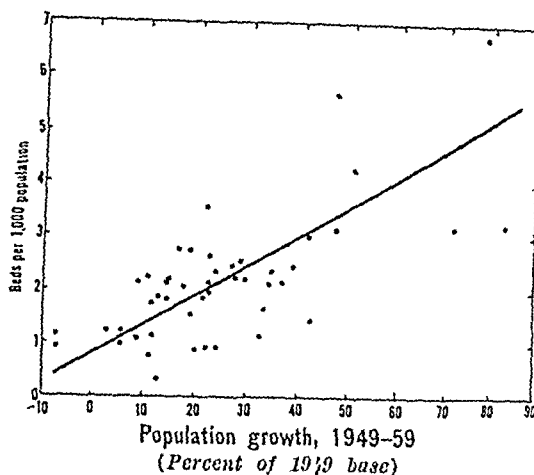
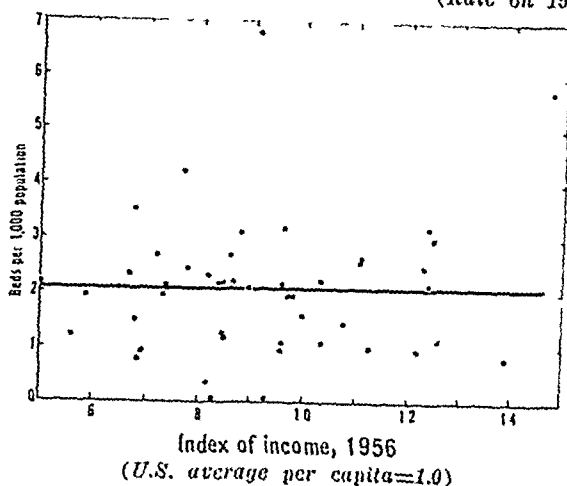
Year (January 1)	Total beds needed ²	Existing beds					Additional beds needed	
		Total	Acceptable			Non- acceptable	Number	Rate per 1,000 pop- ulation
			Number	Rate per 1,000 pop- ulation	Percent of total need			
General hospital beds								
1948.....	652, 974	469, 398	388, 144	2. 81	59. 4	81, 254	264, 830	1. 92
1949.....	652, 611	474, 532	397, 168	2. 84	60. 9	77, 364	255, 443	1. 83
1950.....	682, 601	513, 814	437, 786	2. 99	64. 1	76, 028	244, 815	1. 67
1951.....	700, 952	548, 798	469, 192	3. 15	66. 9	79, 606	231, 760	1. 56
1952.....	708, 574	554, 084	474, 334	3. 13	66. 9	79, 750	234, 240	1. 54
1953.....	714, 469	572, 493	495, 185	3. 23	69. 3	77, 308	219, 222	1. 43
1954.....	704, 400	589, 565	515, 934	3. 34	73. 2	73, 631	188, 420	1. 22
1955.....	720, 001	601, 241	526, 458	3. 32	73. 1	74, 783	193, 543	1. 22
1956.....	722, 112	614, 020	541, 363	3. 35	75. 0	72, 657	180, 749	1. 12
1957.....	726, 821	620, 922	547, 473	3. 33	75. 3	73, 449	179, 926	1. 10
1958.....	745, 016	632, 674	559, 818	3. 33	75. 1	72, 856	185, 776	1. 10
1959.....	761, 610	653, 082	587, 318	3. 43	77. 1	65, 764	174, 292	1. 02
Mental hospital beds								
1948.....	690, 381	427, 201	380, 343	2. 75	55. 1	46, 858	310, 038	2. 24
1949.....	692, 150	428, 931	381, 627	2. 73	55. 1	47, 304	310, 523	2. 22
1950.....	725, 203	462, 859	399, 138	2. 72	55. 0	63, 721	326, 065	2. 22
1951.....	744, 323	483, 310	415, 530	2. 79	55. 8	67, 780	328, 793	2. 21
1952.....	755, 097	482, 733	412, 932	2. 72	54. 7	69, 801	342, 165	2. 25
1953.....	766, 463	490, 598	431, 007	2. 81	56. 2	59, 591	336, 676	2. 20
1954.....	773, 428	500, 568	437, 659	2. 83	56. 6	62, 909	336, 989	2. 18
1955.....	793, 125	513, 278	441, 440	2. 78	55. 7	71, 838	352, 349	2. 22
1956.....	808, 265	520, 010	449, 706	2. 78	55. 6	70, 304	359, 223	2. 22
1957.....	821, 412	525, 455	435, 453	2. 65	53. 0	90, 002	387, 587	2. 36
1958.....	840, 782	528, 406	441, 691	2. 63	52. 5	86, 715	400, 719	2. 38
1959.....	855, 649	533, 587	445, 009	2. 60	52. 0	88, 578	412, 574	2. 41
Tuberculosis hospital beds								
1948.....	155, 987	84, 158	71, 151	0. 51	45. 6	13, 007	84, 836	0. 61
1949.....	155, 101	85, 466	72, 560	. 52	46. 8	12, 906	82, 541	. 59
1950.....	148, 936	94, 024	81, 511	. 56	54. 7	12, 513	67, 425	. 46
1951.....	140, 391	96, 955	85, 351	. 57	60. 8	11, 604	55, 040	. 37
1952.....	133, 899	99, 147	87, 550	. 58	65. 4	11, 597	46, 349	. 31
1953.....	112, 075	100, 204	86, 698	. 57	77. 4	13, 506	30, 934	. 20
1954.....	100, 467	101, 425	86, 035	. 56	85. 6	15, 390	21, 707	. 14
1955.....	96, 507	100, 234	85, 901	. 54	89. 0	14, 333	20, 902	. 13
1956.....	114, 536	96, 268	84, 923	. 52	74. 1	11, 345	36, 533	. 23
1957.....	119, 653	91, 301	81, 491	. 50	68. 1	9, 810	41, 026	. 25
1958.....	114, 449	87, 967	79, 523	. 47	69. 5	8, 444	37, 323	. 22
1959.....	104, 555	84, 445	76, 685	. 45	73. 3	7, 760	18, 788	. 11
Chronic hospital beds								
1948.....	277, 059	35, 955	28, 322	0. 20	10. 2	7, 633	248, 737	1. 80
1949.....	276, 811	36, 250	28, 517	. 20	10. 3	7, 733	248, 294	1. 78
1950.....	293, 312	47, 838	33, 761	. 23	11. 5	14, 077	259, 551	1. 77
1951.....	297, 821	56, 417	39, 845	. 27	13. 4	16, 572	257, 976	1. 73
1952.....	302, 236	57, 872	43, 007	. 28	14. 2	14, 865	259, 229	1. 71
1953.....	306, 272	55, 486	44, 537	. 29	14. 5	10, 949	261, 735	1. 71
1954.....	309, 077	50, 529	43, 428	. 28	14. 1	7, 101	265, 649	1. 72
1955.....	316, 967	60, 319	45, 016	. 28	14. 2	15, 303	271, 951	1. 71
1956.....	315, 497	48, 752	41, 941	. 26	13. 3	6, 811	273, 556	1. 69
1957.....	317, 468	49, 373	42, 574	. 26	13. 7	6, 799	274, 891	1. 67
1958.....	308, 793	50, 785	44, 137	. 26	14. 3	6, 648	264, 656	1. 57
1959.....	305, 936	51, 083	44, 461	. 26	14. 5	6, 622	261, 475	1. 53

¹ Excluding Federal facilities. ² See table 3, footnote 2.

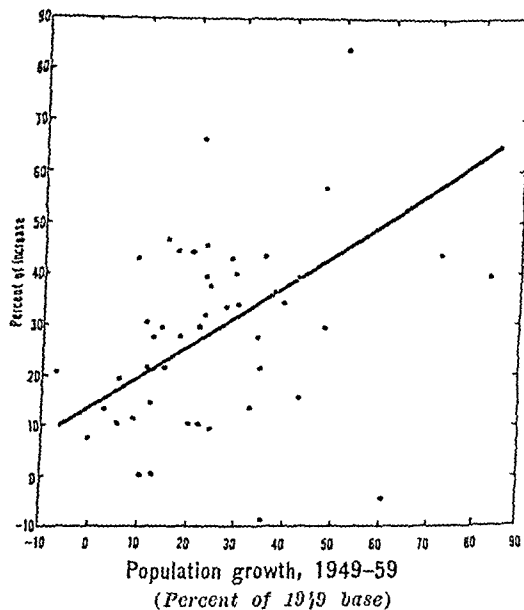
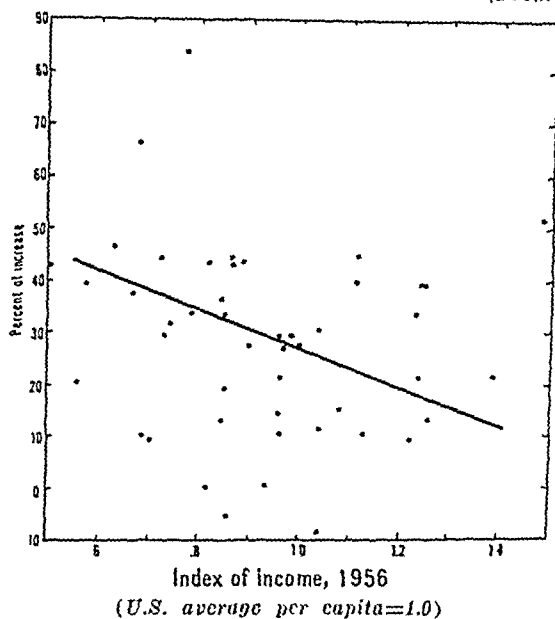
Source: State plans, approved under title VI of the Public Health Service Act.

Figure 2. Increase in total civilian hospital beds in relation to State income level and population growth, 1949-59

AMOUNT OF INCREASE
(Rate on 1949 population base)



PERCENTAGE INCREASE
(From beds in 1949)



has recently withdrawn all uniform standards of adequacy from its regulations for carrying out title VI of the Public Health Service Act, except for a minimum planning level of 2.5 beds per 1,000 population for each service area of general hospitals. Changes may therefore be expected as each State comes to identify its own formal targets of need. This new flexibility may mark a second major phase of positive planning for the Nation's health facilities, after

the early pioneering stage when statewide planning was itself an innovation and uniform standards were a valuable guide.

A Look Ahead

Prospects for the future in regard to the Nation's health plant point to a high construction expenditure during 1959 and 1960. However, because of increased construction costs (about

Table 5. Health facility program goals, 1960-70

Purpose and type	Average annual program		
	Added capacity		Estimated cost (millions)
	Rate per 1,000 pop.	Number	
All facilities.....	-----	-----	\$1,600
<i>Inpatient care</i>			
All inpatient care.....	-----	81,500 beds..	1,490
Population increase at 3 million per year.	7.5	22,500 beds..	405
Additional facilities for 185 million population (average).	.2	37,000 beds..	590
Replacement (facilities 50 years old).	-----	22,000 beds..	395
Modernization.....	-----	-----	100
<i>Outpatient care</i>			
Facilities for diagnosis, treatment, and rehabilitation.	-----	230 units..	70
<i>Research</i>			
At 0.5 percent of operating cost.	-----	-----	40

• Increase in research on hospital planning, operation, and use.

These goals would require construction to provide annually about 81,500 inpatient beds and 230 outpatient facilities, at a total annual cost of \$1,600 million, as shown in table 5. This annual expenditure is about \$600 million more than the amount expended in 1958 for health facility construction. It would constitute a substantial acceleration, with important shifts in emphasis to meet changing conditions. It cannot be achieved without broad understanding and support for its underlying purposes as a national investment for health as a basic resource.

Summary

At the beginning of 1959 the Nation had 1,322,000 non-Federal hospital beds and 245,000

beds in nursing homes which provide skilled nursing care, besides about 134,000 beds for civilians in Federal hospitals.

The rate of new construction is now at an alltime peak, in current dollars, but construction costs have increased by 44 percent within the last decade.

The total gain of more than 300,000 hospital beds since 1948 appears substantial, but when offset by the increase in population it amounts to only 0.5 beds per 1,000 population for acceptable facilities.

States with rapid population growth have increased the total number of hospital beds more rapidly than States of little or no growth.

Percentage gains were greatest in low-income States, where the initial level of availability was low.

Basic standards of total need for hospital beds have decreased somewhat with operating experience in State planning, but the relatively low rates of net gain in beds for hospitals and nursing homes during the past decade in relation to population to be served, indicates a long-continued backlog of needed construction.

State planning tends toward programing for specific construction at a uniform level above present level of availability, rather than upon a uniform standard of need. This may be realistic in the light of economic differentials.

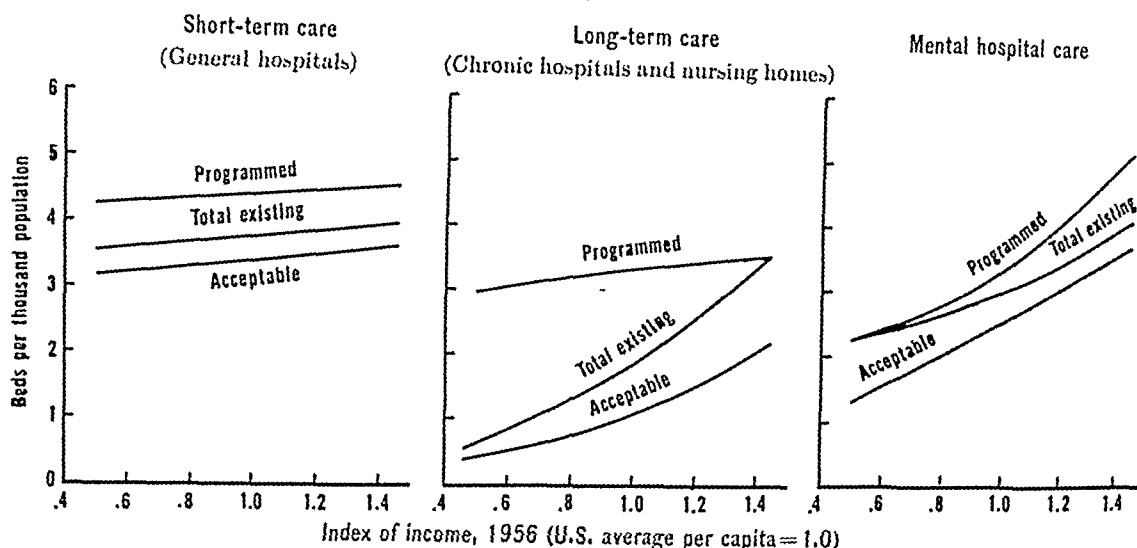
For the future, changes in emphasis to meet shifting needs and new scientific and technological discoveries are expected.

A 10-year program goal has been developed by the Public Health Service to raise the total level of inpatient beds from 7.5 beds per 1,000 population to 9.5 beds per 1,000 by 1970, with increased emphasis on mental hospitals, long-term facilities for the aged, and a modernization program. This would require an estimated expenditure of \$1,600 million annually, which is about 60 percent above the present level of construction.

REFERENCE

- (1) Haldeman, J. C.: Here are the goals for health construction. *Mod. Hosp.* 93: 70-71, October 1959.

Figure 3. Trend of civilian hospital beds available and programed, 1959, in relation to State income level, 1956



44 percent since 1948) much larger sums are required than in the past for comparable results. In addition, scientific and technological changes have created new services and new means of therapy requiring new kinds of facilities, while changes in the age of the population and shifts in population to large cities and their suburbs are creating new needs and maldistribution of facilities, requiring costly relocations. Other factors to be considered include the following:

1. In urban centers the hospital plants are relatively old, needing much renovation and modernization aside from actual replacement.

2. There is a new understanding of the importance of community resources for mental health care in clinics and psychiatric treatment units of the larger community hospitals.

3. The great cost of building and operating hospitals today forces attention to planning for coordination of all resources for health in the community. In particular, the long-term care of the elderly in family settings, clinics, nursing homes, and hospitals requires more attention to provide skilled services in facilities which are interrelated for common purposes.

In the light of these circumstances, which suggest substantial shifts in emphasis, the Public Health Service has recently developed national goals for health facilities during the next decade (1). These goals have guidance status only, but they reflect a concrete program (a)

with genuine net improvement on a scale appropriate to current purposes, (b) feasible to achieve within a time span which recognizes the possible impact of new discoveries in medical knowledge and therapy, and (c) reasonably possible to finance. The goals are as follows:

- Provision of sufficient new beds annually to continue the present level of 7.5 beds per 1,000 population for the annual population increase, which now exceeds 3 million persons.

- Provision of an additional 0.2 beds per 1,000 population annually in order to bring the level of all inpatient beds to 9.5 beds per 1,000 by 1970 (more than double the net advance of 0.80 beds per 1,000 population achieved in the past decade). The total gain by 1970 would be apportioned as follows:

- 0.5 beds per 1,000 for general hospital care.

- 0.5 beds per 1,000 for mental hospital care.

- 1.0 beds per 1,000 for long-term care facilities.

- Replacement of old hospital plant which becomes obsolete annually (obsolete plant being defined as that 50 years old).

- Renovation and modernization over a 10-year period (estimated at \$1 billion).

- Increase in outpatient care facilities to equal the net gain of the last decade for public health centers and diagnostic and treatment centers and a reasonable increase in rehabilitation centers.

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REFERENCE

- (1) Haldeman, J. C.: Here are the goals for health construction. *Mod. Hosp.* 93: 70-74, October 1959.

Genetics and Public Health

N. C. MYRIANTHOPOULOS, Ph.D.

The epidemiological-genetic approach is ideally suited to investigations concerning the estimation of gene frequencies and mutation rates, the selective advantage of certain genotypes, the detection of heterozygous carriers, the metabolic etiology of genetic disease, and the practice of genetic counseling. Progress in any of these areas has numerous public health applications.

THE INCREASING application of human genetics in the fields of epidemiology and preventive medicine has brought about a necessary collaboration of these disciplines on a close and equal basis. Efforts to understand, control, prevent, or eradicate disease are greatly aided by the advances in genetics during the past 25 years and the growing appreciation of the human host as an important factor in the etiology of disease. The ensuing reevaluation and realignment of concepts regarding etiology are well illustrated by Shimkin (1), who, in a recent review on the etiology of cancer, writes:

"There are few, if any, simple or single causes in biology. There are, instead, complex situations and environments in which the probability of certain events is increased. The probability of the neoplastic event following exposure of an organism to a carcinogenic stimulus is modified by a large series of factors. In regard to the stimulus, among the more evident influences are those of dose, route of exposure, physical state of the material, and length and schedule of exposure. In regard to the host, the probability of the neoplastic reaction is influenced by the genetic background, age, sex, nutritional status, and intercurrent

infections. The longer the period between initial exposure and the end point of the reaction, the more opportunities occur for the introduction of additional modifying factors."

It is not too farfetched to claim that all diseases have a genetic component. Heredity, of course, does not operate in a vacuum. The environment influences its expression to a greater or lesser degree, so that it is well nigh impossible to differentiate between "purely genetic" and "purely environmental" disease. In this context the human condition appears as a continuum formed by the interaction of genetic and environmental influences. At one end of the continuum are those diseases in which the genetic factors are most powerful and the influence of the environment negligible; these are illustrated by Huntington's chorea or Tay-Sachs disease. At the other end are those diseases in which environmental factors play the chief role while genetic elements are least influential; these are exemplified by infectious diseases whose occurrence depends on the presence of the infectious agent. Between these two extremes, the genetic and environmental influences operate with varying degrees of interaction in the causation of disease.

When diseases are observed to occur in familial aggregations, it is desirable to clarify the relative roles of heredity and common exposure to some environmental stress. Neel and Schull (2) advance four criteria by which the influence of genetic factors in the etiology of disease can be detected: (a) the occurrence of the disease in definite numerical proportions among individuals related by descent; (b) failure to "spread" to nonrelated individuals; (c) onset at a characteristic age without a known precipitating cause; and (d) greater concordance in identical twins than in fraternal twins. These

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criteria must be applied with extreme caution and critical judgment, for the pitfalls of error are many. For years, for example, because syphilitic women tended to have syphilitic babies, the disease was considered hereditary, although it is now realized that the infant is infected during gestation. Even in a disease such as tuberculosis, although predisposition may be genetically determined, the aggregation of many cases in a family is generally conceded to be a result of common exposure.

In the study of the natural history of a disease, epidemiology is, in a sense, the intelligence service of medicine. It provides information on the extent and distribution of the disease by analyzing its prevalence and incidence, mortality, age and sex distribution, geographic distribution, periodic occurrence, and association with other diseases and environmental factors. Attempts to control, prevent, and eradicate disease depend largely on such epidemiological studies to guide the attack on the causative factors or to strengthen the host and his environment, or both.

Genetics has become an adjunct to both of these fundamental phases of public health: epidemiology and preventive medicine.

Genetics and Epidemiology

The circumstances which have brought genetics and epidemiology together result in part from increasing attention to those usually chronic diseases in which host or genetic factors appear to be relatively important. The incorporation of genetic concepts and techniques in epidemiological research has added a new dimension to medical demography: the assessment of the genetic endowments of populations.

Human genetics has developed in two areas; each stems from the same principles and laws, but operates on a different level. One, the so-called "pedigree genetics," deals with the individual case, the individual family, or a group of families, and is more directly concerned with preventive medicine. This will be discussed later. The other, "population genetics," transcends the individual case and operates at the population level. It deals with the dynamic balance between mutation and selection in relation to the inherited traits of man, that

is, with population characteristics, which are the stock-in-trade of the epidemiologist.

Following are some of the fields where the geneticist and the epidemiologist together study the natural history of genetically determined disease.

Estimation of Gene Frequencies

Knowledge of the presence of a gene which determines a disease is only a first step toward the study of its natural history. We like to know next the prevalence rate, as this is an indispensable tool for the estimation of the gene frequency by genetic theory and method. Suppose a disease determined by a pair of autosomal recessive genes has a prevalence rate of 1 per 30,000 population in the United States. Such a disease is phenylketonuria (3). According to the Hardy-Weinberg law, the gene frequency of this disease (q) is 1 in 173 and the carrier frequency ($2pq$) is 1 in 86. In other words, 1 person out of 86 in the population is a carrier of the phenylketonuria recessive gene. In England the prevalence rate of phenylketonuria is half that of the United States, 1 per 60,000 population (3). The gene frequency of this disease in England is 1 in 215, and one person out of 122 is a carrier of the recessive gene for phenylketonuria. (Actually the frequencies of phenylketonuria as estimated by Jervis in the United States and Munro in England are 1 in 25,000 and 1 in 50,000 respectively. The figures 1 in 30,000 and 1 in 60,000 presented here were derived by excluding those cases known to have consanguineous parents.)

An estimated gene frequency may not apply to the whole population for which it was estimated because the gene may be present in greater frequency among some subgroups of the population than others. The study of the frequency of thalassemia in Rochester, N.Y., is an example (4). It was found that 11 out of 100,000 children born in the city between 1928 and 1942 were affected with the disease, and from this it would appear that the frequency of the heterozygous carriers would be about 1 out of 50 persons. It so happens, however, that there is a rather large isolate of Italian descent in Rochester, and the 11 cases were of children born within this group. The estimate of the thalassemia gene, therefore, would apply only

Recent advances in research in genetics and biochemistry are described in a series of three articles, which began publication in the September 30, 1959, issue of *Scope Weekly*, as offering high hopes for public health.

In effect, the report says the studies give promise of almost unlimited uses of chemistry to correct physical deficiencies and to strengthen the genetic strain. It notes that awareness of enzymatic defects in metabolism has been coupled with methods of repairing such chemical flaws. Moreover, it cites the discovery of the principle of transduction, the transfer of genetic material from one cell to another, as suggesting possibilities of strengthening resistance to parasites, as well as enlarging the mental and physical potentials of humanity.

Basic ideas that have become apparent from such research were defined by Dr. Edward Lawrie Tatum of Rockefeller Institute, who along with Prof. George W. Beadle of the California Institute of Technology and Dr. Joshua Lederberg, then at Stanford University, was a Nobel medical laureate in 1958. Tatum listed the following concepts:

All biochemical processes in all organisms are under genic control.

These processes are resolvable into a series of individual stepwise reactions.

Each single reaction is controlled in a primary fashion by a single gene: there is a one-to-one correspondence between gene and biochemical reaction.

Therefore, the mutation of a single gene results only in an alteration in the ability of the cell to carry out a single primary chemical reaction.

"Perhaps within our lifetime," he said, "the code of life processes tied up in the structure of proteins and nucleic acids will be broken. This may permit the improvement of all living organisms by processes which we might call biological engineering."

In the same article, Dr. Laurence H. Snyder, president of the University of Hawaii, said that biochemistry and genetics offer a sound approach to diagnosis, prevention, and therapy.

He said there are "reasons for believing that genetics is involved in one way or another in the development of all disease."

to the Italian isolate. The total number of births in the isolate during the 15-year period was estimated to have been in the order of 26,000. The frequency of thalassemia in the Italian subpopulation, then, becomes 1 in about 2,400 and the frequency of the heterozygous carriers 1 in 25 persons.

Another case in point is the frequency of the recessive gene for Tay-Sachs disease which has long been suspected of occurring more frequently among Jewish than among non-Jewish people. Kozinn(5) and his associates in a recent study in the New York City area estimated that the gene frequency for Tay-Sachs disease among Jews is about 1 in 100 and the frequency of carriers about 1 in 50, while for non-Jews the gene frequency is about 1 in 660 and the frequency of carriers about 1 in 300. Another study now being conducted by the National Institute of Neurological Diseases and Blindness, Public Health Service, shows the same trend. Since the homozygote in Tay-Sachs

disease dies before reaching reproductive age, only matings between heterozygous carriers will produce affected children. The chance that two Jewish heterozygotes will marry is the product of their separate probabilities of carrying the gene, or 1 in 2,500. The chance, however, that two non-Jewish carriers will marry is only 1 in 90,000 which, admittedly, is very remote. The task of control and prevention of Tay-Sachs disease is quite different in magnitude and intensity in the two groups.

Estimation of Mutation Rates

Nature tends to maintain a balance of forces between selection and mutation. Selection against deleterious genes occurs either naturally or by eugenic practices. Mutation, however, reintroduces these deleterious genes in the population at a specific rate. It is of great importance, therefore, to know the rate at which normal genes mutate in the population if their control or elimination rate is to be ef-

fective. The tools needed here again are both epidemiological and genetic, for any attempt to arrive at an estimate of the mutation rate of a gene must stem from an accurate knowledge of the incidence rate of the disease determined by the gene in question.

Progressive muscular dystrophy of childhood may serve to illustrate the point. This type of muscular dystrophy is inherited in a sex-linked recessive manner; that is, it occurs only in males who receive the "defective" gene, located on the X (sex) chromosome, from their mothers. The mothers of affected boys act as genetic carriers but are not themselves affected because the defective gene is masked, so to speak, by the normal gene, or allele, located at the same position on the other X chromosome. (Females have two X chromosomes, while males have only one.) Thus mothers who are genetic carriers for childhood progressive muscular dystrophy pass on the gene to half of their sons, who develop the disease, and to half of their daughters, who in turn act as genetic carriers.

The onset is usually in about the third year of life and its progress is so rapid that the affected children are invalids by the time they reach 10 to 12 years of age. Few live past the age of 20 years. In spite of the fact that the gene is eliminated with the death of the affected individual before he reaches reproductive age, the frequency of the disease does not change appreciably in the population, and a rather high mutation rate would be required to maintain it at a constant level. Stephens (6) and his associates estimated the mutation rate by ascertaining the number of dystrophics born in Utah during the 10-year period 1931-41. There were 18 such cases, and 6 of these were considered as new mutations because there was good evidence that the gene had not been passed down through a line of female carriers to the affected individuals. Approximately 126,000 children were born in the State during that period. If half of them were males, then 6/63,000 gives the approximate mutation rate per X chromosome per generation. The estimate is 9.5×10^{-5} , or about 1 mutation per 10,000 male births.

The epidemiological-genetic cooperative approach during the last few years has been

instrumental in enabling us to estimate the mutation rates of the genes responsible for many diseases. Some of these estimated mutation rates in man are summarized below:

Condition produced by gene	Mutation rate per million genes per generation
Autosomal dominant:	
Epiloia	8
Chondrodystrophy	42
Pelger's nuclear anomaly.....	80
Aniridia	5
Retinoblastoma	14
Autosomal recessive¹:	
Albinism	28
Congenital total color blindness.....	28
Tay-Sachs disease	11
Ichthyosis congenita.....	11
Cystic fibrosis of the pancreas.....	700
Amyotonia congenita.....	20
Sex-linked recessive:	
Hemophilia	32
Pseudohypertrophic muscular dystrophy.....	95

¹ The general feeling among investigators currently is that mutation rate estimates for autosomal recessive genes may not be valid because of unknown heterozygote effects. If, for example, the heterozygote has a slight advantage sufficient to perpetuate a rare recessive lethal gene in the absence of mutation, then the estimate of the mutation rate would appear to be too high.

Selective Advantage of a Genotype

It has been known from experimental work in lower animals, especially in *Drosophila*, that the heterozygous condition of certain traits may have some selective advantage, that is, be reproductively superior, over either dominant or recessive homozygote. This phenomenon is known in genetic terms as "balanced polymorphism." Although it has been suspected for a long time that balanced polymorphism may operate in man, the first instance of such selective advantage in a human population was dramatically demonstrated by Allison (7) in 1954 with his work on sickle-cell anemia. This disease is genetically determined by a pair of incompletely dominant genes (genes which in the heterozygote produce detectable phenotypic effects). In the homozygous condition, the gene results in a severe, chronic hemolytic anemia which is often fatal before puberty.

In the heterozygous condition, the clinical picture is known as sickle-cell trait and results

in a variable syndrome which is compatible with survival. The gene is apparently much more frequent in Negroes than in whites. It is present in 10 percent of American Negroes, and 1 out of 500 of them is affected with sickle-cell anemia. Allison noted that in spite of the mass elimination of the recessive gene because of its lethality in the homozygous condition, its frequency was abnormally high in certain regions of Africa. This could be explained either on the basis of a high rate of mutation which would reintroduce the gene in the population or by attributing to the heterozygote some selective advantage. Indeed, Allison showed by both observation and experiment that in some regions of central Africa in which the frequency of the gene was very high, the heterozygous state afforded protection from falciparum malaria, which is endemic in those areas. Allison also observed that sickle-cell trait frequencies of 30-40 percent occur in geographically widely separated tribes in Africa and that these tribes are characteristically found in intensely malarious regions. He calculated that the reproductive fitness of the heterozygote must be 1.26 times that of the normal homozygote for an equilibrium to be maintained under these conditions.

Investigations along these lines have barely begun. It is possible that the distribution of many other genetic diseases and the gene frequencies that perpetuate them can be explained by balanced polymorphism. The question should be pursued by epidemiological-genetic methods.

Effects of Geographic Factors

It is well known and accepted as axiomatic that heredity alone is incapable of producing any character; the character in question will appear only if an optimal environment makes its expression possible. A study of environmental conditions, therefore, is essential for the complete understanding of the natural history of a genetically determined disease.

One environmental factor is geographic. Recently Mackay and Myrianthopoulos (8) presented evidence favoring genetic determination of multiple sclerosis. Although they could not postulate a mode of inheritance, they noted, after preliminary analysis of the affected sib-

lings and first cousins of their probands, that the hereditary factors involved must operate with greatly reduced penetrance. Earlier, Kurland and Westlund (9) demonstrated that multiple sclerosis was more prevalent in cold northern climates than in warm southern ones. It is possible that a correlation exists between penetrance and geographic distribution in multiple sclerosis.

Geographic isolation continues to be one of the most important factors in differential distribution of gene frequencies. On the island of Guam, for example, amyotrophic lateral sclerosis is responsible for approximately 10 percent of the deaths, while in the United States amyotrophic lateral sclerosis is estimated as the cause of death in only 0.1 percent of the population. There is good reason to believe that the majority of cases on Guam are genetically determined, while in the United States only a small proportion of cases are found to have positive family history. Whether the geographic isolation, the population size, or other environmental conditions are responsible for the high prevalence of amyotrophic lateral sclerosis on Guam, it is the natural responsibility of the epidemiological-genetic team to investigate.

Genetics and Preventive Medicine

The contributions which genetics has made to many facets of preventive medicine, especially diagnosis and treatment, are well recognized. For example, understanding of the genetics of the Rh factor by physicians and parents has aided in saving thousands of newborn babies that might have perished from erythroblastosis fetalis. Most physicians now routinely include a "family history" in the anamnesis of events of their patients' histories, and some even consider it a deciding factor in differential diagnosis.

Other possible applications of genetics to preventive medicine are not as widely appreciated. In many respects they constitute an untapped source of valuable information in the fight against disease.

Detection of Heterozygous Carriers

Heterozygous carriers, as the term is used here, means not only the carriers of recessive

genes in the heterozygous condition but also the carriers of dominant genes for diseases which have a late onset, such as Huntington's chorea or progressive muscular atrophy. The importance of being able to recognize these individuals who have the potentiality either to produce affected children or become affected themselves is self-evident.

In our search for signs or symptoms by which we would be able to identify the heterozygote, we are presently limited to the observation of recognizable morphological deviations or to the identification of detectable biochemical deviations from the normal. More often than not, these are elusive either because they are so minute as to be considered insignificant or because they occur in areas in which they are inaccessible and unsuspected. In spite of these difficulties, progress toward the recognition of the heterozygous state has been considerable for a good number of diseases. In some cases the heterozygote can be detected with 100 per cent accuracy. In others, the degree of accuracy is much less.

On the basis of our ability to recognize the heterozygous state, genetic diseases can be classified in three categories.

First are those conditions in which the heterozygous state produces a recognizable clinical picture, albeit not as severe as that produced by the homozygous conditions. In this category belong the by now classic sickle-cell anemia which in the heterozygote is manifested as a sickle-cell trait; and thalassemia major which in the heterozygote is manifested as thalassemia minor.

Second are those conditions in which the carrier state is characterized by a subclinical effect with corresponding slight phenotypic change which can be detected with appropriate known and available tests. In this category belong gout whose carrier state shows only hyperuricemia; hereditary hemolytic jaundice which in the carrier state is characterized by asymptomatic spherocytosis; xanthomatosis in which the heterozygote shows hypercholesterolemia.

Finally are those conditions for which the carrier state can be recognized in some but not in all cases. Dystrophia myotonica, Huntington's chorea, galactosemia, Friedreich's ataxia, hemophilia, and a score of other conditions be-

long in this group. For some of these the rate of the detection of the heterozygote comes close to the genetic expectation while for others the degree of accuracy is small. This is not surprising since, as previously mentioned, for most of these conditions the detection of the heterozygote probably depends on the recognition of minute or subtle biochemical deviations which presently available techniques cannot assess accurately.

Neel and Schull (2) compiled a list of diseases in which it may be possible to recognize the carrier state. They devised a grading system of 1-4 to indicate the reliability of recognition of the carrier state, grade 1 being the most reliable and grade 4 the least reliable.

Whatever information is available now, even for diseases in the less reliable grades, can be very useful, when interpreted by an experienced worker, in preventive medicine and especially in genetic counseling. With the perfection of such methods as tolerance tests and the refinement of bioassay methods, it may become possible to detect accurately the heterozygote for many genetic diseases.

Genetics and Metabolism

Modern genetics has particularly studied the ways in which genes act. There is abundant accumulated evidence that genes produce their effects through metabolic pathways. The original investigations in this field by Beadle and Tatum with the mold *Neurospora* won them the Nobel Prize for medicine in 1958. Actually, Sir Archibald Garrod can be regarded as the prodrome of biochemical genetics, for he first drew attention to what he called "inborn errors of metabolism" as far back as 1908. The inherited diseases based on metabolic abnormalities which Garrod described were: alcaptonuria, cystinuria, albinism, porphyria, and pentosuria.

Today a large number of diseases are believed to result from hereditary flaws in protein, carbohydrate, or fat metabolism. For a good number of these diseases, investigators have identified the enzymatic level where occur the metabolic blocks controlled by genes. It is easy to see the significance of such precise knowledge for now the problem can be attacked

at its roots. Two examples cited here illustrate the possibilities.

Phenylketonuria is a metabolic disorder in which, due to metabolic deficiency, there is a failure of transformation of phenylalanine to tyrosine. This block is controlled by a pair of autosomal recessive genes. The molecule whose dysfunction is responsible for this failure is a liver enzyme concerned with the oxidation of phenylalanine. The disturbance is present at birth and is characterized by elimination of phenylpyruvic acid in the urine, various neurological signs, and mental deficiency. Several attempts are now being made to treat children suffering from phenylketonuria with a special diet, free of phenylalanine. Although it is early yet for full evaluation of this treatment, encouraging results have been reported. The present status of the situation has recently been reviewed by Knox and Hsia (10).

Galactosemia, or idiopathic galactosuria, is another metabolic disorder of infants apparently dependent on a pair of recessive genes. It is the result of an inability to convert galactose, a component of milk sugar, into glycogen due to a decrease or absence of the hepatic enzyme Gal-1-P uridyl transferase. The disease is accompanied by severe clinical symptoms such as failure to gain weight, hepatomegaly, jaundice, diarrhea, vomiting, albuminuria, and zonular cataract. When galactosemia is correctly diagnosed, it is often enough to remove galactose from the diet and the clinical manifestations, which otherwise may have serious consequences, disappear.

An opinion shared by many geneticists and biochemists is that all genetically determined diseases are metabolic in origin. If this be true, then as biochemical techniques become more refined and precise, research should be able to uncover the underlying metabolic defect not only in the affected individuals but also in the heterozygous carriers.

Genetic Counseling

Genetic counseling not only has potential importance in the prevention of genetic disease, but also helps to dispel false fears about hereditary traits. The primary function of genetic counseling is to provide people with information regarding their genetic problems.

The physician should be the person most qualified to give genetic advice. He is thoroughly versed in medical matters and also knows intimately the personalities and needs of his clients. Unfortunately, few physicians are trained to give professional advice in genetic problems. Medical schools seldom offer formal training in medical genetics. Neither do they ask for courses in general or human genetics as entrance requirements.

Some of the institutions which have given serious consideration to the teaching of human genetics and the training of scientists in this field have established genetic counseling centers where physicians can refer their patients for counseling and where genetic problems per-

Genetic Counselors and Counseling Centers in the United States and Canada

- P. DAVID: University of Oklahoma, Norman.
F. C. FRASER: Department of Medical Genetics, Montreal Children's Hospital, Canada.
E. J. GARDNER: Department of Zoology, Utah State Agricultural College, Logan.
C. N. HERNDON: Department of Medical Genetics, Bowman Gray School of Medicine, Winston-Salem, N.C.
F. KALLMANN: New York State Psychiatric Institute, New York City.
H. W. KLOEPFER: Tulane University, New Orleans, La.
N. C. MYRIANTHOPOULOS: Genetic Counseling and Research Center, George Washington University Hospital, Washington, D.C.
J. V. NEEL: Heredity Clinic, University of Michigan, Ann Arbor.
C. P. OLIVER: Genetics Foundation, University of Texas, Austin.
S. C. REED: Dight Institute, University of Minnesota, Minneapolis.
F. E. STEPHENS: Laboratory of Human Genetics, University of Utah, Salt Lake City.
C. STERN: University of California, Berkeley.
K. A. STILES: Zoology Department, Michigan State College, East Lansing.
N. F. WALKER: Hospital for Sick Children, Toronto, Canada.
-

taining to the individual, the family, and the community can be handled. There are about a dozen or more such centers in the United States, less than 1 per 10 million people (see list).

No two of the problems which confront the genetic counselor are the same even if they involve identical conditions. Obviously, the people who seek genetic counseling differ in each case with respect to physical and mental makeup, social and economic background, educational level, religious upbringing, and emotional content. Requests for counseling may be anticipatory, as with people contemplating marriage who know that a certain disease exists in one of the families. They would want to know what the chances are that their future children may inherit this disease. Some persons seek genetic counseling inevitably "after the fact," that is, after they have had one or more affected children. In these cases, the condition is usually recessive and the parents not affected. They find that they are genetic carriers when they have one affected child, and they are concerned about the chances of repeating their misfortune.

Many requests for counseling concern children to be placed for adoption. The adoption agency or the prospective parents want to know whether the child is a good adoptive risk, especially if it is known that there has been some undesirable trait in the child's family, such as epilepsy or mental deficiency.

The counselor's job is often complicated by situations which result from irregular action and expression of genes. Some conditions, such as peroneal muscular atrophy, show reduced penetrance; others, such as Friedreich's ataxia and retinitis pigmentosa, are inherited in more than one way; in still others, such as central nervous system malformations, the complex interaction between heredity and environment distorts the genetic ratios to such a degree that a precise evaluation of each component is impossible. The counselor has to consider all of these, and at times he has to resort to empiric risk figures in order to give effective advice. As Reed (11) put it, "It has been our lot to struggle with such complicated traits as schizophrenia, in which the heredity seems to be that of an in-

complete dominant with incomplete penetrance. This sounds too incomplete for words and the impatient soul may decide to toss out the genes altogether."

These difficulties are listed here only to show that the quality of genetic advice depends on thorough mastery of the subject matter in all its known intricate details. Genetic counseling without competent and scientific training in this field may be disastrous to the individual, defeating the whole objective of the profession.

Comment

It is evident that genetics has become an important adjunct to public health practice, teaching, and research. Even so, in some of the areas, such as the detection of the heterozygote or the understanding of the metabolic etiology of disease, the surface has barely been scratched.

The manpower needs are now acutely felt. There is a serious shortage of well-trained human and medical geneticists. In the United States and Canada hardly a dozen institutions offer adequate training in human genetics. There is need for the establishment and support of many more training institutions. There is need for the introduction of courses in human and medical genetics in our medical and public health schools. There is need for the establishment of genetic counseling centers at convenient locations to serve all the people. Only such efforts can realize the potential of genetics in contributing toward the reduction of chronic disease and improvement of public welfare.

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Foster homes meeting prescribed standards are needed for those older or handicapped individuals who require a semiprotected living arrangement but who neither desire nor need the institutional setting for congregate living.

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A full report of papers delivered for the Council on National Defense at the American Medical Association meeting, June 6, 1959, appears in the September 12, 1959, issue of the *Journal of the American Medical Association*. The same issue carries a report on the epidemiology of mental health by Milton Olin, which concludes with a quotation from Dr. Will Menninger: "We live in a turbulent world, a crazy world, with many evidences of man's hostility to man But it is our world; it is what we are making it; and its course depends on the responsibility that you and I assume for it."

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By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, August 26, 1959

The Federal Radiation Council

As most of you are probably aware, the President on August 14, 1959, issued an Executive order establishing the Federal Radiation Council, and along with the order the White House issued a press release which elaborated upon the order.

On August 22, the White House issued a second press release in which I had the honor of being designated by the President as the current chairman of the Federal Radiation Council. That press release also stated:

"The President also directed that the Department of Health, Education, and Welfare intensify its radiological health efforts and have primary responsibility within the executive branch for the collation, analysis, and interpretation of data on environmental radiation levels such as natural background, radiography, medical and industrial use of isotopes and X-rays, and fallout, so that the Secretary of Health, Education, and Welfare may advise the President and the general public."

The action of the President, as reflected in the three documents referred to above, constitutes, in my opinion, a constructive and effective method for dealing with the growing problems of radiological health protection.

Under the President's directive, the existing work of this Department in the radiological health field will be intensified, and the Department will undertake the additional "primary responsibility within the executive branch for the collation, analysis, and interpretation of data on environmental radiation levels . . ."

As a first step in organizing the Department for our expanding work, I have made specific delegations of responsibilities for radiological health activities. These responsibilities, which primarily concern the Public Health Service and the Food and Drug Administration, are

spelled out in the "Manual of General Program Policy—Part 10, Radiation Health," dated August 1959. This is being made a part of the Department's internal manual in which general program policy is set forth.

It should be noted that I have assigned to the Public Health Service the responsibility for "collation, analysis, and interpretation of data on environmental radiation levels as a basis for the Secretary's advice to the President and the general public."

Financial ability, of course, is always an important factor in undertaking new work. For the current fiscal year we have funds available as shown below. For comparison I have also listed the funds that were available in the preceding fiscal year.

	Fiscal year 1959 (actual)	Fiscal year 1960 (available)
Food and Drug Administration	\$78,500	\$400,000
Public Health Service:		
Division of Radiological Health	634,100	2,489,100
General research and services	289,000	300,000
Cancer research ¹	15,000	15,000
Total	\$1,016,600	\$3,204,100

¹ Represents costs of a special study of the effects of uranium radiation on uranium miners.

It will be noted that the 1960 funds are a substantial increase over the funds for 1959.

In addition to the funds identified in the table, the National Institutes of Health also expend funds for therapeutic and diagnostic services in the radiological field. For 1960, the funds available for this purpose total \$3,000,000.

In allocating the funds for 1960, careful consideration will be given to the new assignments given to the Department by the President. As

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Chlorinated Organic Pesticide Residues in Fluid Milk

PAUL A. CLIFFORD, JONAS L. BASSEN, and PAUL A. MILLS

DURING the 4-month period August through November 1958, the Food and Drug Administration conducted a nationwide survey of antibiotic and pesticide residues in raw fluid milk in cooperation with many State, county, and municipal milk control officials.

A total of 936 raw milk samples from 16 Food and Drug Administration Districts were tested for residues of chlorinated organic pesticides. Twenty-three showed residues of 0.1 ppm or more. The findings on antibiotic residues have recently been published (1).

An earlier survey (1955) of antibiotic and pesticide residues in fluid milk by the Food and Drug Administration (2, 3) revealed that 62 percent of the 800 samples tested contained pesticide residues. The samples consisted of pasteurized milk collected at dairies in retail cartons or bottles; thus it was not possible to correlate samples which bore residues with a specific group of producers and thereby to pinpoint the source of contamination.

The results of the 1955 survey were made available to milk control officials, milk industry associations, and the Federal Extension Service of the U.S. Department of Agriculture. The Food and Drug Administration encouraged each group to conduct an educational campaign to promote the safe use of pesticides on dairy farms.

Cooperation was excellent. The four regional committees of State Extension Dairymen, meeting with State Extension Directors and representatives of the U.S. Department of Agriculture in the spring of 1957, adopted a series of recommendations for eliminating antibiotic and pesticide residues from the milk

supply. One of the recommendations was that the Food and Drug Administration continue its surveys.

County agents were encouraged to hold meetings with dairymen. The American Butter Institute, with the assistance of the Food and Drug Administration, prepared a leaflet entitled "Safe Use of Pesticides on Dairy Farms." The leaflet received wide distribution and its message was reprinted in several national farm journals. Other milk industry associations and local national farm organizations conducted an educational campaign among their members.

In planning the present survey the Food and Drug Administration had the active cooperation of State, county, or municipal milk control officials in those areas selected as sampling stations. The Food and Drug Administration supplied the methods of analysis used in the survey for pesticide residues to interested milk control officials and dairy plant managers (4, 5).

Objectives and Plan of the Survey

This survey extended beyond the determination of the incidence and range of pesticide residues in fluid milk. A main objective was to find the source of pesticide residues in all samples containing substantial amounts of any chlorinated organic pesticide. "Substantial"

The authors are with the Food and Drug Administration, Mr. Clifford serving as assistant to the director of the Bureau of Biological and Physical Sciences, Mr. Bassen as food and drug officer in the Bureau of Program Planning and Appraisal, and Mr. Mills as chemist in the Division of Food.

soon as I know how far we can go in carrying out the President's assignments with available funds, I will give consideration to the question of requesting additional funds. It is not necessary for me to cross this bridge at the present time, because such a request cannot be adequately developed and considered until the Congress reconvenes in January.

The Department approaches its expanding role in the radiological health field with the most serious determination to carry out the President's assignment. At the same time, we are sensitive to the complexities involved in the subject, and we have the utmost respect for the labors of the pioneers, both in and out of government, who have preceded us.

Summary of a Doctoral Dissertation

LONGITUDINAL STUDIES OF TUBERCULOSIS PATIENTS REGISTERED IN HAWAII: FACTORS IN SURVIVAL RATES

Survival patterns of tuberculosis patients were investigated. The material was supplied by the history of 4,909 persons placed on the Hawaii tuberculosis case register during the period of January 1, 1947 to June 30, 1953. Various patient-cohorts were categorized by medical and demographic characteristics on registration and by mode of detection of the patient. Survival rates were computed for successive periods after registration for each cohort by methods of analysis which eliminate all competing causes of removal from the register other than death from tuberculosis. The "net" survival rate, so obtained, was used for the comparison of risks of death from tuberculosis in different patient-cohorts.

Of the total study population, 91 percent were alive 6½ years after registration. Patients whose disease was "active" on registration showed a much lower survival rate than did the "nonactive" patients. The rate of mortality from tuberculosis diminished with time after registration, particularly for the "active" patient. The significance of "activity undetermined" seemed dubious from the survival pattern. A clear time trend was noticed for

survivorship improving with year of registration, especially in "active" patients.

The survivorship differed by certain medical and demographic factors. In general, the variation was relatively large in "active" patients but it was relatively slight in "nonactive" patients. The survival rate varied more strongly by bacteriological finding than by clinical sign of activity status of the disease. The mortality was greatest for far advanced active patients.

Survivorship was relatively low for the first five years of life, rose to a maximum at the 15-24 age group, and then decreased with age. Little difference in survival by sex was noticed within specific age groups. The mortality peak observable with the group of adolescents and young adults in the general population, especially in the developing countries, may be due to excessive exposure rather than lowered resistance. Survivorship varied considerably by race.

Patients detected by minifilm surveys had more favorable survival rates than those first diagnosed because of "symptoms."—CHAI BIN PARK, M.D., M.P.H., Ph.D., *University of California, 1959.*

tial residues by paper chromatography, 17 were also analyzed by the appropriate quantitative method. Four of the 17 samples showed no residues. Obviously, these samples can only indicate the extent of false positive results by chromatography whereas we are also concerned with false negatives. A number of districts analyzed some negative phase A and B samples by both paper chromatography and by quantitative methods. Of the 49 samples, there were no false negative results, that is, cases in which the quantitative method revealed substantial residues and paper chromatography did not.

Results

Of a total of 936 phase A samples, 23, or 2.5 percent, contained substantial amounts of residue (an estimated 0.1 ppm or more). DDT, DDE, and DDD were most commonly found. Toxaphene, chlordane, and BHC were encountered less frequently. The results for each district for the 4-month period are given in table 1. No trend was noted toward a higher incidence of samples with substantial residues during any particular month.

During October and November, each district submitted 10 duplicate samples to the Food and Drug Administration's Division of Food for check analysis. These were analyzed by paper chromatography and by fly bioassay. Table 2 summarizes the results by the two methods. By paper chromatography, the Division of Food found substantial residues in 5 of 168 samples (3.0 percent). This figure compares well with that found by the districts. DDT and DDE, DDD, dieldrin, chlordane, BHC, and lindane were found in that order. Indications of aldrin and of heptachlor or its epoxide or both were noted in a few cases. The florasil column eluates of 67 percent of the samples produced no symptoms in flies. Fifteen percent of these eluates caused mortality of more than 10 percent (more than 10 of 100 flies). The MgO column eluates caused no symptoms in 46 percent of the cases and mortality of more than 10 percent in 39 percent of the cases. The higher mortality for the MgO eluates may be due to minute traces of dieldrin, aldrin, or heptachlor epoxide; flies are especially sensitive to these pesticides.

Ten districts found one or more phase A

Table 1. Results on phase A samples examined by Food and Drug Administration Districts

FDA District	Chromatography				Identified by chromatography ¹				
	Number of samples	Number negative or with trace amounts	Number with substantial amounts	Percent with substantial amounts by districts	DDT	BHC	Toxaphene	Chlordane	DDD (TDE)
Atlanta	60	60	0	0					
Baltimore	60	58	2	3.3	1		1		
Boston	60	59	1	1.6		1			
Buffalo	60	59	1	1.6			1		
Chicago	60	60	0	0					
Cincinnati	60	57	3	5.0	2		1		
Denver	60	59	1	1.6	1				
Kansas City	60	55	5	8.3	3			2	
Los Angeles	60	60	0	0					
Minneapolis	30	30	0	0					
New Orleans	60	59	1	1.6	1				
New York	60	59	1	1.6	1				
Philadelphia	60	57	3	5.0	1				2
St. Louis	64	64	0	0					
San Francisco	62	57	5	4.2	2	5			
Seattle	60	60	0	0					
Total	936	913	23	2.5	15	1	3	2	2

¹ Samples with substantial amounts only.

² Some conversion to DDD.

amounts, for this survey, were fixed at 0.1 ppm or more of pesticide residues. We were also anxious to test the value of another chemical screening procedure, namely, paper chromatography, as a control method for the average laboratory. We hoped to detect any seasonal differences in the occurrence of pesticide residues by conducting the survey over a 4-month period; thus from August through November there would be a change in the cow's diet from predominantly pasture to bulk and solid feeds. By including all 16 Food and Drug Administration Districts in the survey, the results might reveal differences in the incidence of pesticide residues in various parts of the United States.

Each Food and Drug Administration District, with the assistance of State and local milk control officials, selected one city in its territory in which to conduct the survey. The cities surveyed and the headquarters of the Food and Drug Administration District in which they are located were: Atlanta, Ga. (Atlanta); Washington, D.C. (Baltimore); Providence, R.I. (Boston); Buffalo, N.Y. (Buffalo); Chicago, Ill. (Chicago); Cincinnati, Ohio (Cincinnati); Denver, Colo. (Denver); Wichita, Kans. (Kansas City); Minneapolis, Minn. (Minneapolis); Los Angeles, Calif. (Los Angeles); New Orleans, La. (New Orleans); Metropolitan New York City (New York); Trenton and Camden, N.J. (Philadelphia); St. Louis, Mo. (St. Louis); San Francisco, Calif. (San Francisco); Seattle, Wash. (Seattle).

In each of these cities, three dairy plants were selected as monthly sampling stations. Thus, 48 sampling stations were included in the survey. Criteria used in selection were (a) an interest and desire on the part of management to cooperate in the survey; (b) a minimum of five milk pickup routes; and (c) feasibility of identifying each producer on each pickup route.

The survey was divided into three phases; phase A, the collection of fluid milk samples from bulk farm tank trucks (a few samples were composites from can routes) at each dairy; phase B, the collection of milk samples from individual producers from the pickup route found to contain "substantial" pesticide residues; and phase C, a visit to the farm pro-

ducer whose milk collected under phase B contained "substantial" residues.

Under phase A, starting in August, 1-quart samples of milk from five milk pickup routes were collected monthly at each dairy. In subsequent months, five additional routes were to be sampled, so that over the 4-month survey period all or nearly all routes were sampled at least once. Among the selected dairy plants the number of routes varied from 5 with an average of 8 producers to 54 with an average of 20 producers. Thus, more intensive testing of the milk supply was possible at those plants with a small number of milk routes. For example, one dairy plant in San Francisco had only five routes and each route was resampled every month for 100 percent coverage of the milk supply. On the other hand, at a dairy plant in Cincinnati with 54 routes, only 20 routes were sampled during the survey period.

Analytical Methods

The samples were initially analyzed by paper chromatography (4,5) for residues of DDT, DDE, DDD, lindane, BHC, dieldrin, chlordane, methoxychlor, toxaphene, and heptachlor. Samples with substantial residues, that is, an estimated 0.1 ppm or more, were analyzed by more exact quantitative methods. Where available, official quantitative methods of the Association of Official Agricultural Chemists were used. Paper chromatography gives only semiquantitative results which are not directly comparable with the results obtained by specific quantitative methods.

Successful application of paper chromatography to milk fat demands a rigorous sample "cleanup" which involves the isolation of microgram quantities of pesticide from all but traces of fatty residues. The cleanup requires steps in which losses of pesticide are almost certainly bound to occur, namely, the acetonitrile partition, the chromatography through adsorbent columns, and the evaporation of the relatively large volumes of solvents.

Thus, the usefulness of paper chromatography as a screening procedure depends on the probability of not missing samples containing substantial residues. Of the 23 phase A samples found by the districts to contain substan-

ed that a commercial exterminator had sprayed this farmer's barn. The inspector visited the exterminator and found that he had sprayed a number of barns in the area with a 0.5 percent DDT solution. He acknowledged knowing that use of DDT around dairy barns was prohibited but finally admitted that he had used DDT because it was cheaper than some of the pesticides approved for use in dairy barns. Among the producers whose barns were sprayed by this exterminator, the inspector found the name of the first producer he had visited.

The New Orleans District investigated one producer under phase C. None of the feed materials—whole corn, wheat shorts, and cottonseed meal—contained pesticide residues although the milk contained 0.06 ppm DDT. A tentative explanation was contamination of pasture with DDT from an unknown source.

The San Francisco District found two producers' milk on one bulk tank route to contain substantial residues of DDT and DDD. Joint inspections were undertaken in December 1958 by the Food and Drug Administration, California Bureau of Dairy Inspection Services, and the fieldman of the dairy bottling plant which received this milk. At one producer's, no substantial residues were found in the milk. The second producer's milk contained 6.3 ppm DDT (8.0 ppm calculated as DDD). Subsequent samples of milk and corn silage from this producer, analyzed by the State Bureau of Dairy

Inspection, revealed 4.8 ppm DDT in the milk and 12 ppm DDT in the silage. The State Bureau of Dairy Services suspended this producer from shipping milk. After this producer's milk was eliminated, a retest of the bulk tank route revealed only trace amounts of DDT. Contaminated corn silage grown on the producer's farm was the source of the pesticide residue in the milk.

The milk of the producer on the second route investigated by San Francisco District in February 1959 contained 2.0 ppm DDT. A sample of alfalfa hay being fed to the herd did not contain detectable residues of DDT. The inspection did not reveal the source of pesticide residue in this producer's milk supply.

Discussion

Although it is difficult to compare the findings in this survey with those in the 1955 survey because more sensitive procedures have since been devised, it is quite clear that there has been a definite improvement in the milk residue picture. As in the 1955 survey, DDT was the most notorious offender in the current survey. Where the sensitive bioassay procedure was employed in essentially the same manner in both surveys (florisil column, table 2) 33 percent of the 1958 samples gave a positive test (which includes trace amounts) for chlorinated organic pesticide residues, as compared with 62 percent in the 1955 survey. Moreover, in the 1955 survey the samples consisted of market milk pasteurized and ready for the consumer; in other words, they represented the mixed output of many individual producers.

In the 1958 survey the primary purpose was to pinpoint the source of contamination. The samples were drawn from bulk tank trucks in which was mixed the raw milk output of only a few producers, generally less than a dozen. Thus, in the 1958 survey one might have expected a higher incidence of very excessive residues, but we did not find this.

Summary

In a 1958 survey conducted by the Food and Drug Administration, 936 samples of raw milk

Table 3. Results on phase B samples

FDA District	Number of bulk tank routes sampled	Number of samples	Number with less than 0.1 ppm	Number with substantial residues
Baltimore-----	2	21	19	2
Boston-----	1	9	9	0
Buffalo-----	1	10	10	0
Denver-----	1	11	11	0
Kansas City-----	2	17	16	1
New Orleans-----	1	2	1	1
New York-----	1	12	12	0
Philadelphia-----	1	13	13	0
San Francisco-----	2	21	18	3
Total-----	12	116	109	7

¹ Percent of samples with substantial residues: 6.0.

Table 2. Results by Food and Drug Administration's Division of Food on 1958 check of milk samples

FDA District	Number of samples	Chromatography					Fly bioassay					
		Florisisl column			MgO column ¹		Florisisl column			MgO column		
		Number negative	Number showing traces	Number with significant amounts	Number negative	Number showing traces	No symptoms	Mortality <10 percent	Mortality >10 percent	No symptoms	Mortality <10 percent	Mortality >10 percent
Atlanta.....	10	-----	10	-----	-----	-----	8	1	1	3	1	6
Baltimore.....	12	-----	12	-----	-----	12	9	1	2	1	1	10
Boston.....	10	4	6	-----	-----	-----	5	5	0	7	3	0
Buffalo.....	10	4	6	-----	4	6	4	3	3	4	5	1
Chicago.....	10	4	6	-----	-----	-----	10	0	0	8	0	2
Cincinnati.....	10	4	6	-----	5	5	10	0	0	10	0	0
Denver.....	10	5	5	-----	2	8	5	5	0	1	0	9
Kansas City.....	10	2	8	-----	-----	-----	10	0	0	15	0	5
Los Angeles.....	10	-----	10	-----	-----	-----	6	1	3	6	4	0
Minneapolis.....	9	-----	9	-----	-----	9	9	0	0	9	0	0
New Orleans.....	10	6	4	-----	5	5	9	1	0	8	1	1
New York.....	10	1	8	1	3	7	4	1	5	2	2	6
Philadelphia.....	10	-----	10	-----	-----	10	7	1	2	0	0	10
St. Louis.....	17	6	11	-----	7	10	4	9	4	6	7	4
San Francisco.....	10	-----	7	3	-----	-----	4	1	5	2	1	7
Seattle.....	10	-----	9	1	-----	-----	9	0	1	5	0	5
Total.....	168	36	127	5	26	72	113	29	26	77	25	66
Percent.....		21.4	75.6	3.0	(2)	(2)	67.3	17.3	15.5	45.8	14.9	39.3

¹ None showed significant amounts.

² Percentages not computed because of insufficiency of data.

samples to contain substantial residues. Nine of these districts proceeded to collect phase B followup samples. In table 3 are given the number of phase B samples collected by each of these districts and the results. Some of the negative results on the phase B samples may be attributed to a transient contamination with pesticide residues or to a delay in followup.

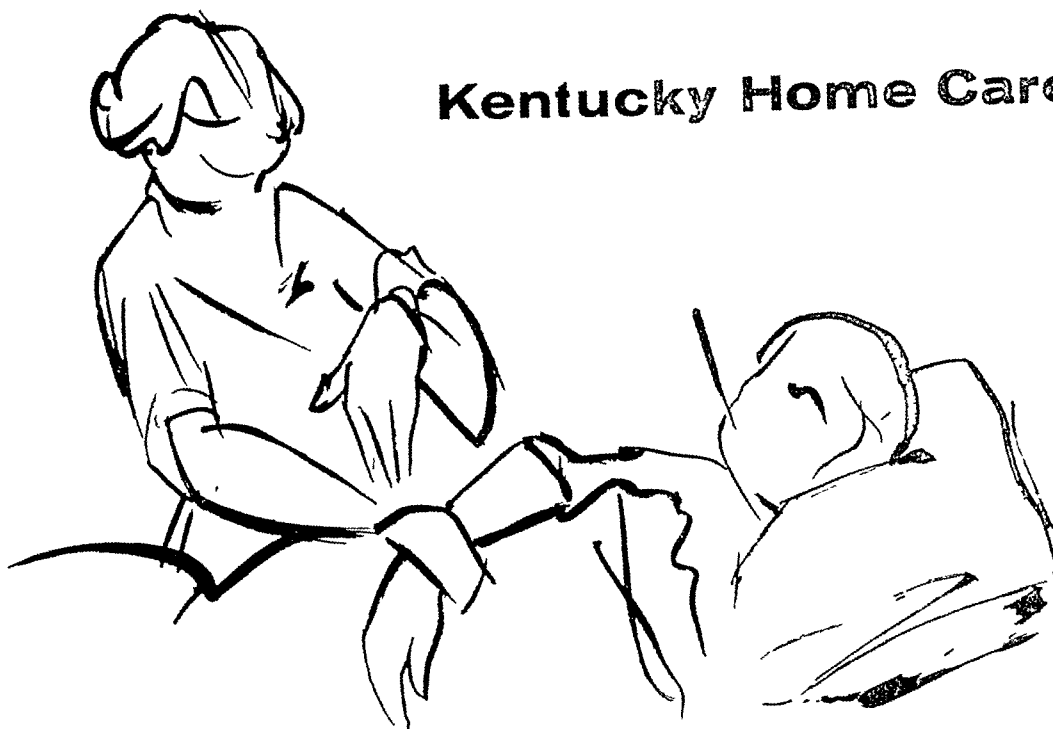
The eight producers whose milk was found to contain substantial residues in phase B were visited by Food and Drug Administration inspectors, usually accompanied by a State or local milk inspector, under phase C of the survey. The producers were questioned about their spraying practices around and in the barn, type and source of feed, and other likely sources of contamination. Samples of milk in all cases, and feed materials where indicated, were collected and analyzed for pesticide residues.

The Baltimore District investigated two producers in January 1959. Milk samples from these farms were negative for pesticide resi-

dues. The cows on both farms were fed a similar diet consisting of mixed dairy feed, clover or alfalfa hay or both, and grass or alfalfa silage. On one farm only one item, clover hay, was found to contain traces of DDT. On the other farm, alfalfa hay and alfalfa silage contained traces of toxaphene.

The Kansas City District investigated two producers under phase C. These producers were delivering milk to two different dairies. Followup at one farm revealed no detectable pesticide residues in any of the samples of hay, grain, and silage being fed. The sample of milk collected at the farm contained 0.03 ppm DDT. The source of the DDT in this producer's milk might have remained a mystery except for the investigation of the second producer. At the latter farm, samples of milk, hay, mixed grain, and silage were collected. The mixed grain, of intrastate origin, contained 0.32 ppm DDT and the milk, 0.3 ppm DDT. On questioning this farmer, the inspector learn-

Kentucky Home Care



Sadieville, Ky.

Dear Doctor _____:

I want to express to you my sincerest appreciation for the work done by the health department in helping old people.

My mother Mrs. _____ aged 87 requested that her last days be spent at home rather than in a hospital. This request would have been impossible to grant had it not been for the untiring efforts of your health nurses.

Especially am I indebted to Mrs. _____. Mother anxiously awaited her visit each day. She always brought along a ray of sunshine with her. Towards the last, when mother was so ill, she worked fervently trying to ease her and make her more comfortable. She showed me many things that made the nursing job easier.

I think this home visitation by the nurses is the most wonderful thing that has happened for the physical welfare of the aged.

Again, may I congratulate you and your staff for the wonderful work which you are doing.

Best regards,

Mrs. _____

THIS LETTER and others like it put into words the public's warm, spontaneous response to Kentucky's home care program, which was set in motion January 1, 1958, by the State health department.

Cooperation the Keynote

Working closely with county medical societies and health agencies, the division of chronic diseases of the Kentucky State Department of Health spearheads and broadens the home care program throughout the State. This is done with the assistance of the department's divisions of health education, public health nursing, and nutrition.

The home care program is more than home nursing. It includes nutrition, physical therapy, and psychiatric and community services. Yet it remains essentially a simple type of service for chronically ill patients needing medical supervision but not hospitalization; those needing continuing medical care, instruction in self-administration of drugs, or special diets; and those who might benefit from home physiotherapy. Services also extend to patients in

from 48 dairies in 16 metropolitan areas in all sections of the United States were analyzed by the 16 Food and Drug Administration's Districts for residues of chlorinated organic pesticides by a paper chromatographic method. The survey was conducted over a 4-month period starting in August. Twenty-three samples (2.5 percent) showed residues of 0.1 ppm or more. Of the 936 samples, 168 were further examined by the Food and Drug Administration's Division of Food. By paper chromatography, five of these, or 3.0 percent, showed significant residues.

These 168 samples were also analyzed in the Division of Food by a fly bioassay procedure. Depending upon the cleanup technique employed, toxic reactions were noted in 33 percent of the samples (florisil column) and in 54 percent of the samples (MgO column). Significant mortalities (taken as more than 10 percent of 100 flies) were 15.5 and 39.3 percent, respectively. The difference in incidence between the chromatographic and bioassay methods is due to the fact that the bioassay reflects the sum of all residues toxic to the housefly. Also, flies are extremely sensitive to certain pesticides (lindane, heptachlor or its epoxide, dieldrin, and others) and a few hundredths of a ppm of these might not register on the paper chromatogram. Comparable figures for the previous and the present survey are: 67 percent positive reactions in 1955 and 33 percent in 1958.

Investigations to determine the source of pesticide residues were limited to eight producers

whose milk was found to contain "substantial" residues. Of these, the source of contamination was definitely accounted for in only three cases. Feeding of DDT-contaminated corn silage (1.2 to 12 ppm DDT) was responsible for high residues, 4.8 and 6.33 ppm DDT, in one producer's milk. The contamination of the milk of the other two producers was traced to the careless spraying of barns with a concentrated DDT solution by a commercial exterminator.

The survey did not reveal any seasonal monthly differences in the occurrence of pesticide residues.

The survey showed that paper chromatography is a useful procedure in detecting substantial residues of organic chloride pesticides in fluid milk.

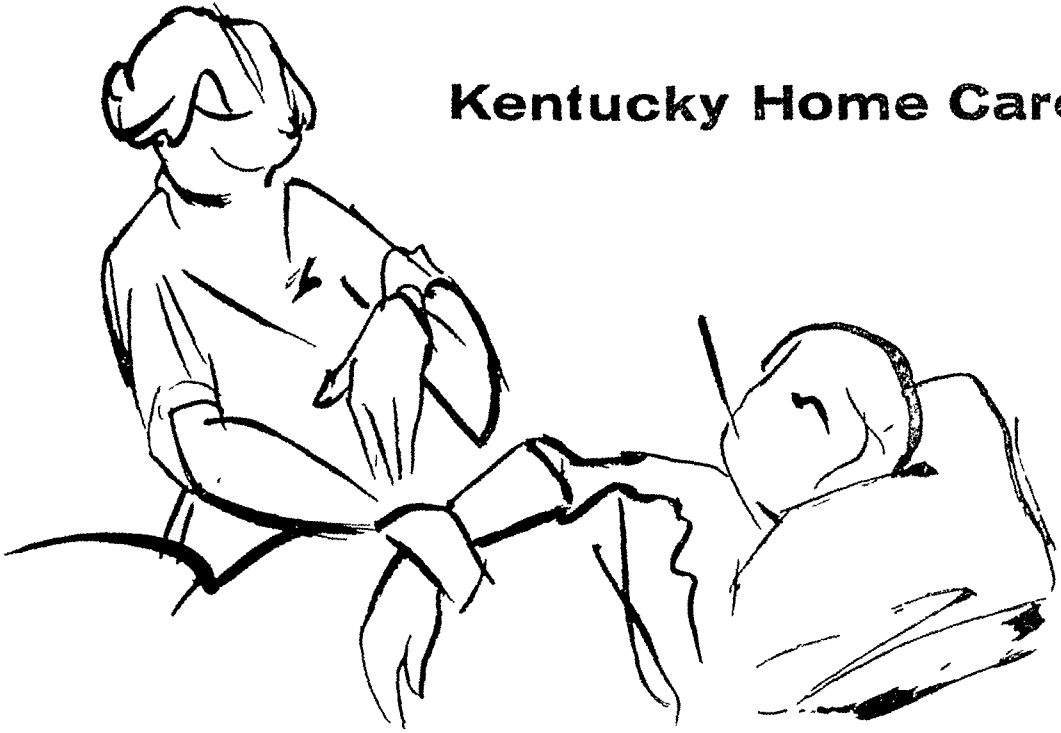
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Deaths From Septicemia

Septicemia and pyemia caused 1,633 deaths in 1958. Of these, 353 were staphylococcal, 64 streptococcal, and 30 pneumococcal. Other agents were specified for 90 of the deaths and 1,126 were unspecified. The increase in all deaths from septicemia and pyemia over the previous year was about 23 percent, and for staphylococcal septicemia it was about 63 percent. The number of deaths from sepsis among the newborn (infants under 1 month) was 1,055, an increase of about 27 percent over 1957. Deaths from septicemia during the period 1949 through 1957 were reported in *Public Health Reports*, April 1959, p. 354.

Kentucky Home Care



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nursing homes without a registered nurse on the staff.

In the five-county area selected for the program's demonstration, an additional nurse has been added to each county nursing staff. All the staff nurses have been trained further by the Louisville Visiting Nurse Association and the Rehabilitation Clinic of the Louisville General Hospital, and a nutritionist, physical therapist, and social worker have been made available by the State health department.

Physician and Nurse Liaison

Home care patients first enter the program on recommendation of the attending physician, who prescribes a specific regimen of care for the nurse. After the visit, the nurse reports back to the physician. The conditions found most frequently among home care patients are cancer, heart disease, hypertension, and rheumatic fever.

Public enthusiasm for the home care program

has brought the opportunity for group activities for the chronically ill and aged in one county, through a Senior Citizens Health Club.

To health agencies contemplating home care programs, the Kentucky State Department of Health offers these guidelines:

If you are waiting for more money, remember, there will never be enough. If there isn't adequate staff, let us use what we have. Leadership? Why not supply your own?

The people, the taxpayers know what they want. When they get services that they want they will support them. There is a lot of evidence that the people want tangible services—not just advice. Where tangible services are provided, the public supports the health department. It's just common sense.

To obtain more information about the Kentucky program of rural home care, write to Russell E. Teague, M.D., Secretary, Kentucky State Department of Health, Louisville, Ky., for a copy of the Bulletin of March-April 1959.

Cutler on Special Assignment

Dr. John C. Cutler, Assistant Surgeon General for Program, Public Health Service, has been assigned to the Allegheny County (Pa.) Health Department to direct that agency's central district.

The assignment was requested by the health directors of both the State and county, primarily to help materialize their plans for a local health demonstration unit which may serve as a model for other areas. Dr. Cutler has also joined the faculty of the University of Pittsburgh Graduate School of Public Health.

Prior to his current post, which he has held since July 1958, Dr. Cutler was assistant director of the National Institute of Allergy and Infectious Diseases, Public Health Service. After his appointment to the Commissioned Corps in 1942, he held a number of research,

instructional, and administrative posts in this country and abroad. He conducted venereal disease research at the Service's research laboratory at Staten Island before continuing his research and control work in this field overseas. In 1948 he received from the Guatemalan Government the Order of Merit for his work during an assignment to the Pan American Health Organization. He also organized a public health demonstration and training program in India for the World Health Organization in 1949-50.

Dr. Cutler is a diplomate of the American Board of Preventive Medicine and Public Health, a fellow of the American Public Health Association, counselor for the International Union Against Venereal Disease and Treponematoses, and director of the District of Columbia Social Hygiene Society.

A careful review of one county's hospital records contributes to the limited knowledge of the pattern of fetal and early neonatal loss and provides information about the adequacy of registration and the medical use of terminology.

Fetal and Early Neonatal Deaths in Onondaga County, New York

EDWARD R. SCHLESINGER, M.D., M.P.H., RUTH K. BEECROFT, M.D., M.P.H.,
HILDA F. SILVERMAN, B.S., and NORMAN C. ALLAWAY, M.Sc.

IN COMPARISON with infant and later mortality, relatively little is known about the incidence of fetal mortality, especially deaths occurring during the early months of gestation. Most information on fetal mortality relates to deaths occurring after 20 weeks of gestation. There are many reports on fetal mortality in individual hospitals, but these have the major drawback of possible selection of patients unrepresentative of the population as a whole. In a few areas, such as in New York City, reporting of fetal deaths at any stage of gestation is required. Since the responsibility for reporting fetal deaths in such an area rests mainly with the hospitals, the extent of possible under-reporting is difficult to ascertain.

Dr. Schlesinger is associate director of medical services, New York State Department of Health, Albany. Dr. Beecroft is regional medical director for the Children's Bureau, Department of Health, Education, and Welfare, Region II, New York City. The late Mrs. Silverman, biostatistician with the New York State Department of Health, supervised the field aspects of the study. Mr. Allaway is associate biostatistician with the department.

As one attempt to make up for these deficiencies, information has been obtained on fetal mortality covering an entire geographic area—Onondaga County, N.Y.—from a direct study of original hospital records. Although this method includes only fetal deaths requiring hospitalization of the mother, it does obviate the factor of selection of patients present in studies in individual hospitals. Furthermore, it permits comparison with data for New York City, where all but a negligible number of the fetal death reports emanate from hospitals.

The primary objective of the study was to obtain as complete a picture as possible, from a review of hospital records, of the incidence of fetal losses occurring in 1951 and 1952 among residents of Onondaga County who were hospitalized in the county. Neonatal deaths occurring during the first 24 hours after birth in the same years were included also because of the possible difficulty in distinguishing fetal deaths occurring immediately before or during birth from neonatal deaths occurring immediately after birth. A secondary objective was the exploration of such questions as the accuracy of the period of gestation reported on the still-birth certificate and the completeness of re-

porting of stillbirths (or fetal deaths occurring after a gestation period of 20 or more weeks, as defined for purposes of reporting in New York State) as compared with information from the hospital records.

Method

Onondaga County was selected for the study for several reasons. Its population, 342,000 at the time of the 1950 census, provided a large enough base for the development of significant rates. More than half the county's population was concentrated in Syracuse, the county seat and only city, which also was its trade center and center for medical and hospital care. Furthermore, all the hospitals in the county were located in Syracuse, and all but about 0.5 percent of the recorded births in the county occurred in these hospitals. Only 5 percent of the births to Onondaga County residents were recorded outside the county.

Local facilities and the possibilities of local cooperation were even more important determinants in the selection of Onondaga County. The performance of many studies in problems relating to fetal and neonatal mortality by the Syracuse City Department of Health and by the departments of obstetrics and pediatrics at the Upstate Medical Center of the University of the State of New York, in Syracuse, tended to assure a receptive attitude on the part of the hospital authorities. The location of a medical school in Syracuse made it feasible to obtain students for a review of hospital records during the summer months between their third and fourth years of medical school.

Four medical students were assigned to the study with the aim of locating as many as possible of the hospital records of fetal and early neonatal deaths in 1951 and 1952. Cases were included in the study if the delivery occurred in a hospital or if the mother was hospitalized within 2 weeks after the event. Each medical student was assigned to one or more hospitals, where he reviewed the records and tabulated the information on schedules designed for the purpose.

A search was first conducted of the diagnostic files of the hospital, using a special guide based on the Standard Nomenclature of Dis-

eases and Operations (1). The hospital discharge diagnosis file was the principal source of cases. This file was supplemented by referral to the doctor's diagnosis card and any other available official hospital files of neonatal deaths, fetal deaths, and operations. Other supplemental sources, when available, included the pathology laboratory file of diagnoses on surgical specimens and autopsies, including those obtained from dilatation and curettage; obstetrics and gynecologic service admitting books; any special files compiled for use of obstetrics and gynecology staff; and information from specific studies.

Review of a patient's chart included examination of the physicians' and nurses' notes, especially at the time of admission and in the delivery or operating room. Each chart was searched also for pathology laboratory reports, special attention being given to reports of microscopic specimens for findings of decidual tissue or other evidence of pregnancy. No cases were included in the study purely on the basis of a history of a pregnancy which terminated previous to 2 weeks before hospital admission. The length of gestation in weeks was calculated directly from information obtained from hospital records.

The decision as to whether any case should be recorded as a fetal death or an early neonatal death depended on information pertaining to evidence of life on the hospital records. Each fetal death was recorded, in accordance with the recommendation of the World Health Organization, as early (less than 20 completed weeks of gestation), intermediate (20 completed weeks

Table 1. Fetal and early neonatal mortality, Onondaga County, N.Y., 1951-52

Mortality index	1951	1952	1951-52
Fetal death ratio ¹ -----	87.1	90.5	88.9
Fetal death rate ² -----	80.2	83.0	81.6
Early neonatal death rate ³ -----	11.2	12.3	11.8
Fetal and early neonatal death rate ⁴ -----	90.5	94.3	92.4

¹ Fetal deaths per 1,000 live births.

² Fetal deaths per 1,000 live births and fetal deaths.

³ Early neonatal deaths (within 24 hours after birth) per 1,000 live births.

⁴ Fetal deaths and early neonatal deaths per 1,000 live births and fetal deaths.

Table 2. Distribution of fetal and early neonatal deaths according to the World Health Organization classification, Onondaga County, N.Y., 1951-52

Classification of deaths	Number	Percent
Total deaths.....	1, 707	100. 0
Fetal deaths.....	1, 456	85. 3
Early.....	985	167. 7
Intermediate.....	123	18. 4
Late.....	216	114. 8
Not stated.....	132	19. 1
Early neonatal deaths ²	193	11. 3
Period of death not stated.....	58	3. 4

¹ Percent of fetal deaths.

² Within 24 hours after birth.

of gestation but less than 28), late (28 completed weeks of gestation and over), or period of death not stated for a death that could not reasonably be classified. The physician's statement of the outcome (abortion, miscarriage, stillbirth, neonatal death, or not stated) was also recorded. Stillbirth and live birth certificates were reviewed, and the reported length of gestation was noted.

For residents of Syracuse the census tract in which the family resided was established, and mortality rates were related to the socioeconomic status of the tracts. Socioeconomic status was determined by using an index developed by Willie (2). This index is based on average monthly rental, market value of owned homes, proportion of detached single-family dwellings, median school years completed by adults 25 years of age or older, and the proportion of operatives, service workers, and laborers reported in the 1950 U.S. census. Six groups of census tracts were constituted, and were designated on a scale from I (high) to VI (low).

Results

The fetal and early neonatal death rates for each of the study years are given in table 1. For comparison with other areas, in which the ratio of fetal deaths to live births is used, rather than the ratio of fetal deaths to the total of live births and fetal deaths, the fetal death ratios are also given.

The number of fetal and neonatal deaths and the proportion of fetal deaths according to length of gestation, by the World Health Organization classification, are given in table 2. Sixty-eight percent of the 1,456 fetal deaths were classified as early, contrasted with 8.4 percent in the intermediate group and 14.8 percent in the late group; 9.1 percent could not be readily classified because of lack of information in the hospital records.

The only study which we have found to lend itself readily to comparison with the Onondaga County experience is one reported by Erhardt relating to New York City data for 1950 (3). As indicated previously, the New York City figures are based on reports submitted to the city department of health, rather than from a direct study of the hospital records. The type of material provided by the two studies is comparable, however, since the reports received in New York City emanate almost entirely from hospitals.

The proportions of classifiable fetal deaths in the early, intermediate, and late groups were very similar in the Onondaga County and New York City studies (table 3). The only marked

Table 3. Comparison of fetal deaths according to length of gestation, New York City, 1950, and Onondaga County, N.Y., 1951-52

Weeks of gestation	Number of fetal deaths		Percentage distribution ¹	
	Onondaga County	New York City	Onondaga County	New York City
0-19 (early).....	985	12, 255	74. 4	77. 0
0-3.....	23	85	1. 7	5. 5
4-7.....	89	2, 179	6. 7	13. 7
8-11.....	408	5, 620	30. 8	35. 3
12-15.....	333	2, 937	25. 2	18. 4
16-19.....	132	1, 434	10. 0	9. 0
20-27 (intermediate).....	123	1, 337	9. 3	8. 4
20-23.....	76	891	5. 7	5. 6
24-27.....	47	443	3. 5	2. 8
28 or more (late).....	216	2, 328	16. 3	14. 6
28-31.....	43	417	3. 2	2. 6
32-35.....	41	404	3. 1	2. 5
36-39.....	76	468	5. 7	2. 9
40 or more.....	56	1, 039	4. 2	6. 5
Unknown.....	132	485	-----	-----
Total.....	1, 456	16, 405	-----	-----

¹ Based on fetal death records from which length of gestation could be calculated.

Table 4. Fetal and early neonatal death rates by age of mother, Onondaga County, N.Y., 1951-52

Age of mother (years)	Fetal death rate ¹	Early neonatal death rate ²
Less than 20-----	55.4	11.7
20-24-----	67.0	9.9
25-29-----	69.8	9.8
30-34-----	90.7	11.3
35-39-----	130.7	20.6
40 or over-----	184.8	23.3

¹ Fetal deaths per 1,000 live births and fetal deaths.

² Deaths within 24 hours after birth per 1,000 live births.

differences in distribution of fetal deaths occurred in the breakdown of early fetal deaths by 4-week periods. The proportion of fetal deaths in the 4- to 7-week and the 8- to 11-week groups is higher in New York City. These differences were balanced by a higher proportion of deaths between 12 and 20 weeks of gestation in Onondaga County. Whether these differences are real or due simply to errors in reporting cannot be determined. If the latter, it would mean that there is a tendency for hospitals to report fetal deaths occurring before the 20th week of gestation as having a shorter gestation period than is actually the case, since the Onondaga County data are based on direct calculation of the length of gestation from data in the hospital records.

Table 5. Fetal and early neonatal death rates by socioeconomic status of census tract of family residence, Syracuse, N.Y., 1951-52

Socioeconomic status ¹	Number of census tracts	Fetal death rate ²	Early neonatal death rate ³
I-----	3	88.7	3.7
II-----	6	99.9	9.8
III-----	10	79.7	10.0
IV-----	11	92.6	10.0
V-----	12	93.6	13.6
VI-----	17	97.3	16.1

¹ I is highest, VI is lowest.

² Fetal deaths per 1,000 live births and fetal deaths.

³ Deaths within 24 hours after birth per 1,000 live births.

As shown by the data in table 4, the fetal death rate increased steadily with advancing age of the mother, with a sharp increase after age 35 years. The early neonatal death rate was definitely higher only in the groups aged 35 years and over. Since the number of early neonatal deaths is much smaller than that of fetal deaths, however, the variations in the early neonatal death rates are not as significant.

A crude index of the relationship of socioeconomic status and fetal and early neonatal mortality among Syracuse residents is presented in table 5. The census tracts are grouped by descending status from the highest in group I to the lowest in group VI. It should be emphasized that the considerable degree of variation in socioeconomic status within the census tracts may tend to reduce the sharpness of any differences among the various tracts. No trend in the fetal death rates is discernible with change in socioeconomic status. On the other hand, the early neonatal death rate, even though based on smaller numbers, shows a distinct increase with decline in socioeconomic status.

Table 6 shows the extent of agreement, within 2 weeks, of the length of gestation as calculated from 382 hospital records with that stated on

Table 6. Extent of agreement, within 2 weeks, of length of gestation reported on hospital records and on stillbirth and birth certificates, Onondaga County, N.Y., 1951-52

Weeks of gestation reported on hospital record	Fetal deaths		Early neonatal deaths ¹	
	Number	Percent agreement with vital record	Number	Percent agreement with vital record
Total deaths registered-----	228	64.9	154	65.6
Less than 20 ² -----	1	75.0	5	60.0
20-23-----	16	53.6	24	62.5
24-27-----	28	53.6	41	56.1
28-31-----	31	48.4	16	68.8
32-35-----	33	69.7	10	60.0
36-41-----	102	73.5	46	80.4
42 or more-----	17	41.2	12	50.0

¹ Within 24 hours after birth.

² Stillbirth certificate not required.

Table 7. Extent and kind of vital registration compared with the World Health Organization classification of deaths, Onondaga County, N.Y., 1951-52

Classification of deaths	Total	Vital record filed		
		None	Still-birth certificate	Birth and death certificates
Total deaths.....	1, 707	1, 230	284	193
Early fetal death ¹	985	983	1	1
Intermediate fetal death.....	123	71	52	0
Late fetal death.....	216	14	202	0
Fetal death, group not classifiable.....	132	117	15	0
Early neonatal death ²	193	4	2	187
Death not classifiable.....	58	41	12	5

¹ Stillbirth certificate not required.

² Within 24 hours after birth.

stillbirth and live birth certificates. (Only fetal deaths after 20 or more weeks of gestation are reportable in New York State outside New York City.) Among both the fetal deaths and the early neonatal deaths there is about two-thirds agreement. There appears to be greater agreement at and around term than at other periods of gestation.

An analysis of the extent and kind of vital registration according to the World Health Organization classification of deaths is presented in table 7. The greatest degree of under-registration among the deaths for which reporting is mandated was found among the intermediate fetal deaths. In this group, stillbirth certificates were filed for only 52 out of 123, or 42 percent of the deaths. Among the 216 late fetal deaths, 94 percent were registered as stillbirths. Of the 194 early neonatal deaths, 97 percent were registered as births and deaths, 1 percent were registered as stillbirths, and 2 percent were not registered.

Comparison of evidence of life found in hospital records with the kind of vital record filed revealed a close correspondence between the two (table 8). Of the deaths with evidence of life indicated in the hospital record, all but six had birth and death certificates filed. Among

these six, there were two registered as stillbirths. One of these, at 22 weeks' gestation, was stated to have had a detectable heartbeat for several minutes. The other, surprisingly, had a calculated length of gestation of 40 weeks and was stated to have lived for 7 hours.

There were four deaths with recorded evidence of life which were not registered. Every one of these had periods of gestation of less than 20 weeks, and in each instance the evidence of life after delivery was fleeting. The large number of instances in which there was no specific reference on the hospital record to presence or absence of life is rather striking.

The relationship between the physician's statement of the outcome of pregnancy in clinical terms to the outcome according to the World Health Organization classification was the final point investigated. Roughly, the term "abortus" or "abortion" corresponds to early fetal death, "miscarriage" to intermediate fetal death, and "stillbirth" to late fetal death. Comparison revealed the greatest degree of agreement, 92 percent, between the physician's statement of abortion and early fetal deaths among those classifiable by the World Health Organization's definitions (table 9). Agreement between the use of the term "stillbirth" and the classification as late fetal death, 82 percent, was less, but only in the use of the term "miscarriage" was there a gross discrepancy. Only 5 out of 23 deaths called miscarriages with calculable periods of gestation, or 22 percent, fell within the limits for intermediate fetal deaths. Fourteen, or 61 percent, corresponded to early fetal deaths, and 4, or 17 percent, to late

Table 8. Relation between evidence of life and extent and kind of vital registration, Onondaga County, N.Y., 1951-52

Vital record filed	Total	Evidence of life		
		No	Yes	Not stated
Total deaths.....	1, 707	1, 147	185	375
None.....	1, 230	919	4	307
Stillbirth certificate.....	284	227	2	55
Birth and death certificates.....	193	1	179	13

Table 9. Physician's statement of outcome compared with World Health Organization classification of deaths, Onondaga County, N.Y., 1951-52

Classification of deaths	Total	Physician's statement					
		Abortion	Miscarriage	Stillbirth	Neonatal death	Other	Not stated
Total deaths.....	1,707	1,142	43	265	187	49	21
Early fetal death.....	985	925	14	1	0	41	4
Intermediate fetal death.....	123	74	5	43	0	1	0
Late fetal death.....	216	10	4	201	0	0	1
Fetal death, group not classifiable.....	132	91	15	15	0	6	2
Early neonatal death ¹	194	4	0	2	187	0	0
Death not classifiable.....	58	35	5	3	0	1	14

¹ Within 24 hours after birth.

fetal deaths. A larger proportion of deaths termed miscarriages were not classifiable by World Health Organization definition than either abortions or stillbirths.

Summary

A study was made of 1951 and 1952 hospital records in Onondaga County, N.Y., to determine the incidence of fetal and early neonatal losses.

Of the total of 1,456 fetal deaths, 67.7 percent occurred before 20 weeks of gestation, 8.4 percent between 20 weeks and 28 weeks, and 14.8 percent after 28 weeks; 9.1 percent could not be readily classified. The proportions of classifiable fetal deaths in the early, intermediate, and late groups were very similar to those found in New York City studies based on reports to the city health department.

The fetal death rates and, to a lesser extent, the early neonatal death rates increased with advancing age of the mother. No trend was discernible in the fetal deaths with change in socioeconomic status of the census tract of family residence, but the early neonatal death rate was inversely related to socioeconomic status.

Agreement between the length of gestation calculated from the hospital records and that stated on the registration forms was about two-thirds for both fetal and early neonatal deaths. Under-registration was greatest for the intermediate fetal deaths, with only 42 percent of such deaths registered. Only 6 out of 182 deaths with evidence of life indicated in the hospital records, however, did not have live birth and death certificates filed. In comparing the physician's statement of the outcome of pregnancy with the classification of the deaths according to the World Health Organization definitions, agreement was lowest between the term "miscarriage" and the corresponding classification of intermediate fetal death.

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- (2) Willie, C. V.: Socio-economic and ethnic areas in Syracuse, New York. Unpublished doctoral dissertation. Syracuse, N.Y., Syracuse University, Department of Sociology and Anthropology, 1957.
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Sampling Microbiological Aerosols

ANALYSIS of biological forms in the atmosphere has not, until recently, enjoyed the attention given to the study of chemical, inert, and radioactive pollutants. However, the emergence of antibiotic resistant staphylococcal strains in hospitals, the high prevalence of minor respiratory illness revealed by the U.S. National Health Survey, and the potentialities of biological warfare have stimulated attention to the processes of airborne infection and the use of instruments to detect, identify, and assess biological contamination of the air. In particular, instrument methods are sought to sample the flora of the atmosphere.

This monograph acquaints personnel in hospitals and government and private research laboratories and other interested persons with the principles and problems of sampling airborne micro-organisms and with the numerous devices that can be used for a variety of air-sampling conditions. It serves as an aid to those establishing and conducting a biological air-sampling program by supplying information concerning bacterial air-sampling methods, particle sizing, selection of samplers, operational methods, and descriptions and characteristics of many different biological air samplers.

The basic methods of aerosol sampling are: impingement in liquids, impaction on solid surfaces, filtration, sedimentation, centrifugation, electrostatic precipitation, and thermal precipitation. Samplers based on all of these methods have been developed and are described in the monograph.

When selecting a sampler for a specific sampling program one must first have a clear understanding of the type of information that is desired and the particular determinations that must be made. For example, in the studies of airborne micro-organisms and their relation to respiratory infections, information is required concerning the size of the sampled particles. This can be obtained by use of impac-

tion-type samplers, which contain a series of stages through which air passes at different velocities.

For other studies it may be desirable to determine how the airborne microbiological content varies with time. This also can be accomplished with impaction-type samplers if the impacting surface is moved in such a way that the location of the aerosol particles on the collecting surfaces indicates the time that the particles were collected.

No one type of sampler can provide the answers required for all sampling problems. It is because of this consideration that so many different types of aerosol samplers have been de-

Public Health Monograph No. 60

Sampling Microbiological Aerosols. By Harold W. Wolf, Peter Skaliy, Lawrence B. Hall, Marvin M. Harris, Herbert M. Decker, Lee M. Buchanan, and Charles M. Dahlgren. Public Health Monograph No. 60 (PHS Pub. No. 686), 53 pages, illustrated. U.S. Government Printing Office, Washington, D.C., 1959, 45 cents.

The accompanying summary covers the principal contents of Public Health Monograph No. 60, published concurrently with this issue of *Public Health Reports*. This monograph is the joint work of members of the Technical Development Laboratories, Communicable Disease Center, Public Health Service, and the U.S. Army Chemical Corps, Fort Detrick, Md.

For readers wishing the data in full, copies are on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Official agencies and others directly concerned may obtain single sample copies without charge from the Public Inquiries Branch, Office of Information, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

veloped. To help the investigator select the type most adaptable to his particular problem, a table lists the samplers according to the basic methods of aerosol sampling and gives operating characteristics and limitations of each type.

A section devoted to operational methods discusses the control and measurement of air-sampling rates, sterilization of samplers, formulations of bacteriological media and collecting fluids, and processing of samples. It contains formulas for computation of sampling data.

Another section contains suggestions for consideration when planning a sampling program. Since selection of a proper sampler is also de-

pendent upon the expected concentration that must be sampled, information is provided on the normal bacterial levels found in an industrialized urban area and in a rural area. Bacterial levels created by various activities inside several buildings are also presented.

The final chapter illustrates 37 different biological samplers. Accompanying each illustration is a detailed description of the sampler, including operating information. References relating to the use of the sampler and the commercial source are listed. If the sampler is not commercially available, a source is given where engineering drawings can be obtained.

International Conference on Mental Retardation

A pioneer worldwide medical conference for the purpose of bringing into sharper focus and evaluating causes of mental retardation was held in Portland, Maine, July 27-31, 1959. More than 600 conferees representing 40 States in this country and 33 foreign lands attended the sessions.

Underscoring the need for continuing research in mental deficiency, the First International Medical Conference on Mental Retardation set up a permanent organization for concerted work. A permanent committee was organized of physicians from Wales, Germany, Austria, Sweden, Denmark, Italy, Poland, France, Argentina, and the United States. Dr. K. Kundratitz of Vienna, Austria, was named chairman. That city was selected for the 1961 conference.

Featuring 35 speakers, the program included reports on pathological findings in the brain of mentally retarded patients; malformations produced in animals by abnormal food, poisons, or other types of damage; inborn metabolic errors explained by abnormalities in the enzyme function; experiments

in autonomic regulation in the brain; pathological findings in birth trauma and asphyxia; differences of metabolism and oxygen utilization in animals before and after birth; sequels of infectious diseases of the central nervous system in respect to mental development; metabolism of the amino acids and the diseases now considered related to abnormalities in amino acid metabolism; the metabolism of copper, iron, and lead and related diseases with mental deterioration; and recent findings of chromosomal abnormalities in mentally retarded persons.

Conference exhibits included aspects of phenylketonuria; a simple method for the detection of amino-aciduria; rare types of mental deficiency; toxoplasmosis; and ataractics in the treatment of mentally retarded children.

The conference recommended that all governments of the world set aside sufficient funds for furthering knowledge of mental retardation, as well as its medical treatment and social and educational needs.

Proceedings of the conference will be available in published form in the spring of 1960.

Federal Publications

Proceedings of the 1959 Annual Conference of the Surgeon General, Public Health Service, With State and Territorial Mental Health Authorities. *PHS Publication No. 705; 1959; 36 pages.*

Addresses and actions of the annual conference of the Surgeon General with mental health authorities are reported. This is his first conference with this group at a time different from the meeting with State and Territorial health officers.

Recommendations pertain to the use of Hill-Burton funds for joint interstate facilities, an ad hoc committee to work with the Service in formulating treatment and administrative guidelines for statewide plans for mental health facilities, study of patient-care costs, training and research programs, matching requirements for community mental health grants, additional grant aid where needed, amendment of social security laws relating to mental health patients, projects in research applications, aftercare programs and services, and vocational rehabilitation.

Health Statistics From the U.S. National Health Survey. Limitation of activity and mobility due to chronic conditions, United States, July 1957-June 1958. *PHS Publication No. 584-B11; 1959; 40 pages; 30 cents.*

Activity limitation data in this report refer to persons reported in household interviews as being unable to carry on their major activities of working, keeping house, or going to school; limited in amount or kind of major activity; or not curtailed in major activity but otherwise restricted. Mobility limitation data describe persons having difficulty getting around alone, unable to get around alone, or confined to the house. Twenty tables show numbers and percentage distributions by major activity, family income, sex and age, sex and urban-rural resi-

dence, and age and urban-rural residence.

The appendixes carry technical notes on methods, definitions of terms, and a reproduction of the questionnaire on which the information was elicited.

Sanitary Engineering Manpower. *PHS Publication No. 703; 1959; by Frank A. Butrico and Israel Light; 32 pages; 25 cents.*

An attempt to assess the strength of the sanitary engineering specialty, this booklet presents a composite picture of almost two-thirds of the total estimated sanitary engineers in the country. It gives the age, education, professional experience, years of service, kind of work and type of employer, income, and related characteristics of approximately 4,000 such engineers.

The original data were gathered in cooperation with the National Science Foundation's Scientific and Engineering Manpower Unit.

Bibliography on Cancer for Nurses. *PHS Publication No. 687 (Public Health Bibliography Series No. 26); 1959; by Patricia B. Geiser; 38 pages; 20 cents.*

Four hundred and fifty-one selected references and thirty-seven films are listed to help nurses and nursing students locate source material from nursing and other related fields. References from professional journals and the films are annotated.

A list of companies that manufacture prosthetic devices and equipment used in the care of patients with cancer is also provided.

Methods of Making Sanitation Ratings of Milk Sheds. *PHS Publication No. 678; 1959; 19 pages; 15 cents.*

Procedures for evaluating community milk supplies are presented to help State milk control authorities measure objectively the extent to which communities adopting the

Milk Ordinance and Code recommended by the Public Health Service are enforcing its provisions. Figures are included to show how data collected are tabulated and the numerical rating calculated.

This booklet can also be used as a guide for rating interstate milk supplies under the cooperative State-PIIS voluntary program.

Examinations for Cervical Cancer. *PHS Publication No. 707; 1959; leaflet.* Intended for private practitioners and physicians attending beneficiaries of governmental medical care. Briefly describes digital and visual examinations, Papanicolaou smear, and Schiller test and biopsy. Outlines steps in prevention and control of cervical cancer. Depicts advantages of early diagnosis.

Facts on Blindness in the United States. *PHS Publication No. 706; 1959; 6 pages; single copies 5 cents, \$2.50 per 100.*

Written for the general public, this leaflet is intended for use by health departments and community groups in promoting information programs and glaucoma casefinding activities.

It identifies the 10 leading causes of blindness and emphasizes the importance of periodic physical examinations in preventing unnecessary loss of sight. Text and tables present basic information on incidence and prevalence of blindness and the cost of financial aid to the blind.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

The Public Health Service does not supply publications other than its own.



EXPERIMENTAL STUDIES OF NATURAL PURIFICATION IN POLLUTED WATERS

IV. THE INFLUENCE OF THE PLANKTON ON THE BIOCHEMICAL OXIDATION OF ORGANIC MATTER

By C. T. BUTTERFIELD, *Bacteriologist*, W. C. PURDY, *Plankton Expert*, and E. J. THERIAULT, *Chemist*, *United States Public Health Service*

The abstraction of dissolved oxygen from polluted water during the natural purification process is a well-known phenomenon. It is also well known that the amount of dissolved oxygen used up is definitely related to the amount of pollution present. While these facts in regard to the natural purification of polluted water are well established, the mechanism by which the oxidation is accomplished can only be surmised. For instance, if a portion of polluted water is examined, many bacteria and plankton are found. If all of these organisms are killed or removed from the water, oxidation ceases. The interrelations of these biological factors and the part that each plays in the process of natural purification constitute the subject of this study.

Extensive studies are described in the literature on the rate and extent of biochemical oxidation of polluted water. In general, these studies have been confined to a determination of the amounts of dissolved oxygen absorbed after various periods of incubation at different temperatures without reference to the biological factors con-

FEBRUARY 20, 1931, pp. 393-426

C. T. Butterfield, W. C. Purdy, and E. J. Theriault advanced the theory that the chief function of certain plankton in the biochemical oxidation process was to reduce bacteria below the saturation point, thus providing conditions suitable for bacterial multiplication, which resulted in more complete oxidation. In a series of seven articles they reported experimental studies of the interaction of biological factors in the natural purification of polluted waters.

1959 INDEX

Public Health Reports

Volume 74, January–December

and

Public Health Monographs

Numbers 56–60

THIS INDEX to *Public Health Reports* and Public Health Monographs is divided into a subject index and an author index.

The subject index carries one or more entries for each item published. In addition to the subject headings, categorical headings include ANNOUNCEMENTS (EXAMINATIONS, ORGANIZATIONS, PERSONNEL), CONFERENCE REPORTS, DEATHS, LEGAL NOTES, and MONOGRAPHS.

Public Health Monographs published concurrently with *Public Health Reports* in 1959 are listed in numerical order under the category heading MONOGRAPHS. The monograph summaries appearing in the journal are indexed under appropriate subject headings.

One asterisk before the page number indicates an original, signed article. The sign of two asterisks, used only in the author index, indicates a monograph. Entries without any symbol may refer to summaries or briefs of papers presented at conferences, narrative conference reports, statements or reports of committees, short reports without authors, or similar items.

Illustrative material on the inside of the front cover of each issue is indexed by month under the heading FRONTISPIECES. It is recommended that the covers be included in a bound volume.

An annual list of Public Health Service publications may be obtained from the Public Inquiries Branch, Office of Information.

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EDITOR'S CORRECTION

In the article entitled "Inapparent Infection: Relation of Latent and Dormant Infections to Microbial Persistence," by Walsh McDermott, M.D., *Public Health Reports*, June 1959, the seven paragraphs beginning with "It might well be questioned . . ." on page 493, middle of the first column, and ending with ". . . with dysentery bacilli" on page 494, bottom of first column, should be inserted on page 489, second column, preceding the subhead "The Antimicrobial Drug."

